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COLLECTIVE REVIEW

RATIONALE AND FACTORS FOR CONSIDERATION IN COOPER'S LIGAMENT HERNIOPLASTY

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IN the departure from the early operative procedures used in the treatment of inguinal hernia, the significance of certain technical maneuvers may be lost sight of, and when they are revived a half century later they may appear to those unfamiliar with the evolution of hernial operations as new techniques. The late Harvey Cushing said, "No idea is wholly new; what is new is getting people to adopt it and act upon it." How true this aphorism is when one attempts to rationalize and present a serviceable conception of myriad technical variants of hernial operations. In such an analysis it is essential that we understand not only the normal but also variations in the normal anatomical pattern which may be present prior to the development and progression of the hernia. Without such knowledge it is not possible to appreciate fully the extent of the parietal deficiency and to evaluate the existing structural distortion which the technical maneuver is intended to overcome. When it is undertaken with this knowledge the repetition of technical pitfalls may be avoided. Further, any improvement of a reparative technique has a greater likelihood of success and perhaps of lasting survival if based upon anatomical knowledge, fundamental physiological facts, and sound surgical principles. Cumulative knowledge of the relationship and destiny of the parietal strata is being continually enhanced through the diligence of those uniquely equipped to further meticulous anatomical dissection and embryologic research. Currently Anson and McVay have made notable contributions in this field. Coincidentally, correlative clinical application of these anatomical advances has led to a wider adoption of plastic methods in hernial repair.

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The universal acceptance of the operative treatment of hernia has now spanned several decades. During this interim of more than a half century there has been increasing surgical experience, which incidentally has afforded the opportunity of introducing many variants in technique without altering the underlying basic principles of the repair. Consequently, there have been few milestones in the evolutionary development of modern methods of hernial repair. In surgery, as in other fields of endeavor, technical procedures, new and old, are repeatedly challenged, and perhaps there has been technical quiescence or even temporary regression at times, but the lull in enthusiasm has been short lived. Invariably, there has followed a revival of interest which on an extended appraisal resolves any doubt as to the steady improvement in this special field of surgery.

For a quarter of a century one unvarying feature of all hernial repairs was the use of the inguinal ligament as the sheet anchor for the parietal wall. The results of this widely recognized technique, however, were not wholly satisfactory, and for this reason a few surgeons (10, 24, 26, 35, 42) proposed the substitution of Cooper's ligament for the inguinal ligament, which, in reality, was not a new idea. Gradually, by the process of evolution and revival, Cooper's ligament has become recognized as playing an important auxiliary

and, in some instances, fundamental, role in herniorrhaphy. The employment of this ligament augments the security of the floor and presents points of surgical excellence not possessed by transfixion of the wall to the inguinal ligament.

Many technical variants in the practical application of Cooper's ligament have been described but the criteria for the use of this ligament as contrasted with the inguinal ligament have not been presented in the literature. Several factors may be responsible for this missing link in the progressive use of Cooper's ligament for repair. A discussion of some of these factors is the purpose of this paper. It will be confined to: (1) the evaluation and availability of Cooper's ligament, (2) reasons for lack of more general acceptance of herniorrhaphy with Cooper's ligament, and (3) the proposal of criteria for its employment. A description of our technique and a statistical analysis of our results are in preparation.

COOPER'S LIGAMENT

Of the surgically important ligaments of the inguinal region, the iliopectineal (Cooper's) is perhaps the least known generally; yet, in 1804 it was described by Sir Astley Cooper who was the first to propose its use in the repair of femoral hernia. However, the clinical application of Cooper's proposal was not realized until 1876 when Annandale employed this ligament in the closure of the femoral ring following ligation of the femoralized sac. This operation antedated by 11 years the publication of Bassini's classical and world renowned technique for the repair of inguinal hernia with Poupart's ligament. To Lotheissen (1898) and to his contemporary, Narath, are given the distinction of being the first to use Cooper's ligament in the repair of inguinal hernia. Incidentally, Lotheissen was operating on a recurrent inguinal hernia when he discovered that Poupart's ligament was totally inadequate and did not exist as an integral structure. Consequently, out of dire necessity and drawing on his fund of anatomical knowledge he exposed Cooper's ligament to which he transfixed the conjoined tendon. Despite Lotheissen's resourcefulness and his success in 12 repairs, there followed a long interim in which the use of this ligament was abandoned. Its use was subsequently revived by Moschcowitz, Seelig and Tuholske, Dickson, McClure and Fallis, and others (18, 32, 35). In striking contrast, during the same period there was remarkable progress made in the treatment of indirect and direct hernias by employment of the inguinal ligament, with disregard of the potentialities of the underlying deeper ligamentous structure. This coexisting revolutionary concept in the development of hernial operations, with the use of Cooper's instead of Poupart's ligament, was brought about by the introduction of the Bassini-Halsted technique which was given wide publicity in the medical journals of the Continent and America. The simplicity of the latter and the feature of repositioning the cord gained rapid acceptance which has survived perennial challenges for a half century.

The fascial composition of Cooper's ligament has been variously described. Authorities, however, are generally agreed that no fascia is basic in its formation but represents fusion of adjacent closely anatomically and generically related fascial and aponeurotic planes, the fascia transversalis, the lateral expansion of the rectus insertion, and the pectineus fascia. Cooper's ligament is pyriform, remarkably constant, and of unvarying density. It is adherent to the superior pubic ramus and intimately attached to the iliopectineal line. It has an internal or vertical surface and a dense superior, almost flat surface. The underlying pecten of the ramus is ridgelike which produces the overlying angulation of the ligament at the juncture of its vertical and superior surfaces. Some French and German anatomists have enumerated in minute detail the fascial, tendinous, and aponeurotic structures that conjoin to form Cooper's ligament, but which actually are of little practical surgical importance. A review of the current literature strikingly illustrates that former obstacles to the use of Cooper's ligament are being overcome and the acceptance of this type of herniorrhaphy as one of the standard techniques is decidedly on the increase. In the broader concept there is no dissent regarding the gross anatomical demarcations or structural sufficiency of this ligament. Further, it possesses certain strategic advantages not inherent in the inguinal ligament: its boundaries do not become distorted by the herniated mass; there is no alteration in its topographic classification, and it does not become attenuated or fragmented. This ligament is not so easily accessible as the inguinal ligament and confusion persists in regard to its terminology.

REASONS FOR RELUCTANCE IN ACCEPTING COOPER'S LIGAMENT IN HERNIA REPAIR

Tardiness of the profession in general in accepting the use of Cooper's ligament in hernia repair may be attributed to the following reasons:

1. The decided lack of accurate and detailed knowledge or available textbook references to this ligament. This deficiency in knowledge of the aponeurotic and fascial continuities encountered

in the inguinopectineal region still prevails to a greater extent than we are prone to admit. Any doubt as to the validity of this statement can be resolved by interviewing our colleagues and junior surgeons. From Cooper's book it is not possible to obtain a clear understanding of this ligamentous structure. Seelig and Tuholske in their quest for more meticulous anatomical information on this ligament consulted, in addition to American and English texts, many French and German anatomies. Surprisingly, their investigation revealed that anatomists are not in complete agreement on what fascial structures conjoin to form Cooper's ligament. Moreover, the anatomical drawings of this ligament are too frequently stereotyped and often devoid of structural correlation. Naturally, with this paucity of knowledge and with scarcely any available references, there has been reluctance to adopt the use of Cooper's ligament especially when so much complacency exists as regards the results following repair with the inguinal ligament. Recently, however, Anson and McVay, through anatomical research of the inguinal region, have contributed much toward clarifying our knowledge of Cooper's ligament. Their contributions have also enhanced our understanding of the relationship and continuity of the musculoaponeurotic strata of the inguinohypogastric region. Similarly, they have traced the destiny of the enveloping fasciae of the parietal strata comprising the wall of the inguinal canal.

2. The multiplicity of names by which this ligament is identified—Cooper's, pectineal, iliopectineal, pubic, and superior pubic ligament—superimposes further confusion. In conformity to the early custom, an anatomical structure was named after its discoverer. In this instance, Cooper not only was the discoverer of the ligament which bears his name, but he possessed the exceptional foresight of predicting its clinical application in the treatment of femoral hernia. While we do not wish to detract from Cooper's noteworthy achievements, in the interest of clarity, it would be better that all proper names give way to anatomical nomenclature. The older literature leaned toward the terms "pectineal" and "iliopectineal," but the modern writers have developed a predilection for "superior pubic" and "pubic." The latter tend to emphasize the entire underlying bone structure, the superior pubic ramus, while the former are more specific since they refer to an undisputed and universally recognized anatomical line of the ramus, the iliopectineal line or pecten. This line extends from the eminentia iliopectinea or iliopectineal junction to the pubic tubercle. Therefore, in a strictly anatomical sense it would seem that "iliopectineal" is the preferable term for this ligament. It is realized that the Basle Nomina Anatomica has classified this ligament as the superior pubic.

3. The false complacency of surgeons concerning the results of the femoral, subinguinal, or inferior approach offered little incentive to developing other possible maneuvers in the hope of finding a better technique for the repair of femoral hernia. It was not realized that total extirpation of the peritoneal sac by this route is impossible. Actually, only the excision of the subligamentous portion of the sac is possible and the surgeon is limited to a simple repair of the pectineal fascia. Both of these features are currently conceded as inadequate in our present concept of hernia repair. Furthermore, in using the inferior approach the surgeon fails to take into consideration the genesis of femoral hernia, which is not infrequently a manifestation of a coexisting polylocular inguinal hernia. Consequently, it is not possible to recognize, evaluate, or correct the composite saccular or coexisting mural deficiency of the inguinal region by the femoral route. In retrospect, the perpetuation of the latter technique has been based upon invalid premises and a misconception of its results. Incidentally, this erroneous operative approach has retarded wider adoption of the superior or inguinal approach in the treatment of femoral hernia.

4. Possibly the most important deterrent to the acceptance of the Cooper's ligament technique has been the potential technical difficulties encountered because the ligament is deeply placed, and the juxtaposition of the external iliac vessels creates the exaggerated fear of inadvertently puncturing them. The obturator vessels, if present, should be ligated, for the occasional tearing of these vessels in the exposure of the pubic ramus will probably cause the surgeon more concern than the possibility of puncture of the iliofemoral vessels. By routine ligation of the inferior epigastric vessels, better exposure of Cooper's ligament is obtained, and in our experience we have encountered no complications attributable to this procedure. The placement of the most lateral sutures in Cooper's ligament may be slightly more hazardous than in the inguinal ligament for the surgeon who is undisciplined in hernial technique and not thoroughly familiar with the anatomy of this region. However, these obstacles are mainly mental hazards which vanish with surgical experience and training.

5. The classification of inguinal hernia as given in most texts is misleading. For instance, the junior surgeon is taught that femoral hernia is a

distinct entity apart from inguinal hernia. In reality, a femoral hernia is simply a variant of the peritoneal sac in which a locule makes its exit through a patent femoral ring. There is no embryonal basis for assuming that the femoral locule arises from a preformed peritoneal vestige as obtains in indirect hernia. McClure and Fallis found in a series of 90 femoral hernias that 22.3 per cent of the patients had undergone repair of inguinal hernia previously. Such a high incidence of femoral locules in recurrent inguinal hernias points convincingly to the probability that femoral locules are frequently not diligently searched for and consequently overlooked at the time of the initial repair. Similarly, Burton and Ramos in an analysis of 131 recurrent hernias found a much higher incidence of coexisting locules than were encountered in primary hernias. In this series there was an incidence of 13.8 per cent of diverticular locules as compared to 2.6 per cent in 2,302 primary hernias. Such a wide discrepancy of diverticular locules in recurrent and primary hernias strikingly illustrates the necessity of thorough digital exploration of the peritoneal sac for coexisting variants. These statistical data should be convincing evidence of the rationale of the inguinal route in the treatment of all inguinofemoral hernias. The contention that the femoral variant cannot be delivered from the superior approach is not valid. In our series of 190 repairs with Cooper's ligament no modification of the usual oblique skin incision of the inguinal region was necessary. In those femoral hernias which are incarcerated or strangulated the imprisoned bowel can be examined before it disappears into the abdomen. This is another advantage of the inguinal over the femoral route. In rare instances the lateral margin of the lacunar ligament may require sectioning to facilitate reduction.

6. Another important contributing factor which is retarding the acceptance of repair with Cooper's ligament is the failure to establish definite criteria for its employment. Most articles on the radical treatment of hernia have dealt almost exclusively with the technical phase of the operation and have omitted any discussion of the indications for the particular technical procedure. With emphasis of the criteria for the respective operative techniques, there is greater likelihood that the selected repair will be more physiological, more rational, and ultimately more successful.

CRITERIA FOR THE EMPLOYMENT OF COOPER'S LIGAMENT

1. Femoral loculation of the sac.
2. Insufficiency of the inguinal ligament.
3. Marked laxity of the parietal strata.
4. Arborization of the sac.
5. Multiple interfascicular defects with fascial incompetency.

For an operation to be successful, recognition of its indications is just as essential as correct execution of the various maneuvers of its technique. Progress in surgery depends not only on the increasingly efficient application of advanced knowledge and techniques but also on the constant acquisition of new information. The failure to establish and to define clearly the criteria for the major phases of hernial operations, namely, herniotomy, herniorrhaphy and hernioplasty, is perhaps the most important factor contributing to existing confusion regarding the practical application of the fundamental principles underlying the numerous hernial operations. A common denominator embodying certain limitations in which the less experienced can safely follow should be available. The general acceptance of such a concept would promote standardization of a retinue of techniques and aid in comparative statistical studies. Therefore, the criteria as proposed for the employment of Cooper's ligament are only intended to serve as a guide, allowing, of course, some leeway in their interpretation according to the judgment and experience of the surgeon.

1. Femoral loculation of the sac. All inguinal hernias have a peritoneal sac. The sac may have one or more outpouchings or locules. It is the anatomical location of the initial exit of the locule and/or locules that determines the type of hernia. For instance, if a locule of the sac protrudes through the femoral ring into the canal it is known as a femoral hernia. Actually it is simply one variant of the sac. There may be other coexisting locules. Unfortunately, most textbooks of surgery and many articles in the current surgical journals classify femoral hernia as a separate entity distinct from inguinal hernia. The responsibility for this erroneous conception, and in a large measure for its irrational treatment, is traceable to the same sources.

The total excision of the sac inclusive of its locules is the first prerequisite to the cure of any hernia. This dictum of Bassini and Halsted (16) is equally true today. In small indirect hernias with no coexisting mural weakness, this maneuver will suffice. However, in the presence of other variants of the sac or concomitant parietal defects, additive reinforcement of the wall is imperative. Therefore, with our present knowledge of the mural and saccular embryogenesis of hernia, it logically follows that any technique which does not completely expose the structures of the inguinal canal and

which does not permit total removal of the peritoneal sac must be viewed with misgivings as to its adequacy. The inferior or femoral approach does not permit visualization of any structure above or internal to the inguinal ligament and therefore it precludes total extirpation of the sac. This route only permits ligation of the femoral variant at its juncture with the parent sac. Further, it is not possible to determine the presence or absence of other locules of the sac or to appraise the integrity of the structures of the floor of the canal from this approach. Apropos, I should like to point out that ligation of the peritoneal locule at the level of the femoral ring is comparable to obliteration of the funicular component of the sac at the external or aponeurotic ring, a procedure which has been abandoned as inadequate since the exposure of the inguinal canal by Championniere in 1881. The technique of removal of the sac should follow a well established plan (Fig. 1). The femoral variant should first be inguinalized after which it is handled as in any inguinal hernia (Fig. 2). Should the femoral locule arise from the direct component of the sac, a frequent finding, an intermediary step of indirectalizing the direct variant (Fig. 3) will be necessary before complete removal of the sac.

2. *Insufficiency of the inguinal ligament.* Structural inadequacy of the inguinal ligament should be suspected in all recurrent hernias and in those primary hernias exhibiting diffuse weakness of the wall. The presence of a defect in the floor which has no clearly definable fascial boundary further enhances this suspicion. However, conclusive evidence of ligamentous insufficiency may not be recognizable without exposure by careful dissection of each parietal stratum. After mobilization of these structures, determination of the tensile strength of the inguinal ligament and that of the related fascial planes is simplified. Sharing in importance with the integrity of this ligament is the relative fixity of its inferior margin, which can be demonstrated by downward pressure directed from within or by making traction on the ligament oralward. If either of these maneuvers produce widening of the interligamentous or subinguinal space, particularly if there is concomitant anterior curving or convexity of its inferior margin, the ligament is considered inadequate for reparative purposes. Often the diffuse bulging encountered in the presence of such coexisting structural deficiency is frequently mistaken for a femoral hernia.

To overcome the deficiency of the inguinal ligament 3 alternatives have been proposed: (1) substitution of Cooper's ligament; (2) running a suture, preferably fascial, through the inferior margin of the inguinal ligament and through Cooper's ligament, which steadies the former (the criterion for this maneuver is a ligament of normal density with no attenuation but possessing undue laxity); and (3) when there is practically total destruction of the inguinal ligament, replacement with a pedicled fascial graft.

Lotheissen's ingenious idea of substituting Cooper's ligament for the inguinal ligament for anchorage of the parietal wall has received more sustained favorable reception than either of the other technical procedures. Among the chief proponents of this procedure are Dickson, Fallis, McClure, and Harkins and Swenson. However, neither Lotheissen nor his contemporary, Narath, made any attempt to implement the repair by closing the interligamentous triangular space. In those cases in which only ligamentous laxity is present, Moschcowitz, and later Seelig and Tuholske, advocated suturing the inferior margin of the inguinal ligament to Cooper's ligament. Payne employs a pedicled suture from the external aponeurosis for the closure of this space. However, this maneuver does not obviate the necessity of complemental repair of the floor by Bassini's method or one of its modifications. Therefore, Cooper's ligament plays only an auxiliary role in the Moschcowitz technique. Ordinarily, one should expect long standing, massive hernias to predispose to weakness of the inguinal ligament, in contrast to a higher incidence of friability or fragmentation of the ligament in cases of recurrent hernias.

Methods of replacing Poupart's ligament have been described by Wilmoth, Cowell, and Turner, which have definitive variations but are fundamentally alike. They consist in transplanting a pedicled fascial flap from the anterior surface of the tensor fascia femoris muscle and fixing its inferior margin to Cooper's ligament. Strategically, it would seem that in rebuilding the floor of the canal this maneuver offers no advantages and is technically more difficult than transfixion of all the parietal layers jointly to Cooper's ligament. The latter reparative innovation has its counterpart in Joyce's method, differing only in substituting Cooper's ligament for the inguinal ligament. Wangensteen's iliotibial tract transplantation is indicated when inadequacy of the fascia transversalis is also present.

3. *Marked laxity of the parietal strata.* Initially, the weakness of the floor of the canal is congenital, arising from maldevelopment and maldescent of the gubernacular cord and from anomalies occurring during the process of differentiation of the

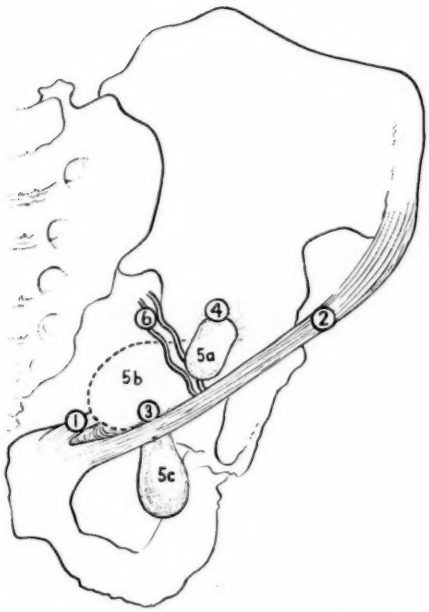

Fig. 1. Mobilization and conversion of multilocular hernial sac. Sac showing indirect, direct, and femoral locules.

abdominal wall plate into three parallel superimposed muscles with their enveloping fascias. Intra-abdominal pressure, traction, gravity, muscle contraction, and the expanding hernial mass play their respective roles in contributing to pressure atrophy and ultimate distortion of the parietal wall.

The decision of the adequacy of a structural variant may be an equivocal one. At times, laxity with diminished tone can be differentiated from attenuation of the tissues by stretching only by the experienced surgeon. Aside from embryonal weakness and parietal agenesis of the internal oblique muscle, the attenuation of the wall is due chiefly to the progressive enlargement and pistoning action of the hernial mass. From a reparative standpoint the mural deficiency is more important than the type of hernia present. For instance, in large indirect hernias the epigastric vessels are displaced medially and may rest under the rectus muscle. There is, of course, concomitant loss of the obliquity of the canal. With the exception of the position of the epigastric vessels, the parietal distortion is almost identical with that of large direct hernias which require similar corrective measures.

There is another anatomical type of hernia ordinarily not recognized in which the predominant feature is one of systemic mesoblastic weakness, most manifest in the groin. The coexisting sac is small, frequently without an ascertainable neck, and of secondary importance. This type is frequently found in the asthenic individual presenting subclinical myasthenia. It is conceivable that the individuals in whom the angle of divergence of the anterior abdominal wall and the pubic bone is greater, and in whom, therefore, the infundibuliform space is larger, would be predisposed to hernia in the inguinal sector (Morgan and Anson). Individuals of this type are frequently rejected by the industrial physician. Surgical measures are required principally to reinforce and make taut the composite atonic wall. In this group the ablation of the sac and closure of the hernial defect will not suffice as it does not correct the generalized laxity of the lower anterior abdominal wall. Since Poupart's ligament participates in the coexisting weakness by reason of its derivation from the external aponeurosis, it should not be used for anchorage; but by substitution of Cooper's ligament, which is strong and unyielding, a taut, resistant wall is attained. The repair may be implemented by a fascial suture spanning the interligamentous space, which will simultaneously correct the laxity of the inguinal ligament and further add to the general security of the wall.

4. Arborization of the sac. Total excision of the sac and its locules is universally accepted as the first cardinal step in the modern repair of hernia. This prerequisite in the surgical treatment of hernia has progressed through many evolutionary phases from ligation of the sac at the external ring, ligation in the canal, and, finally, after opening of the external aponeurosis, to ligation at the abdominal level of the internal ring. The recognition of the frequency of the polylocular sac has made it obligatory to explore digitally the interior of every sac. Statistical studies of recurrent hernias (5, 6, 11, 21, 28) have shown that overlooked locules and, consequently, failure to remove them at the initial repair is a more frequent cause of relapse than is generally believed. Similarly, the shortening of the operating time by transsecting the scrotal sac without freeing its fundus, as proposed by Stoker and O'Hara, has been abandoned because of incompleteness and because of the occasional complicating hydrocele of the saccular remnant. Incidentally, much collateral information may be gained regarding the dynamics of the hernia by understanding the anatom cal anomalies predisposing to the development of the devious routes of the saccular variants.

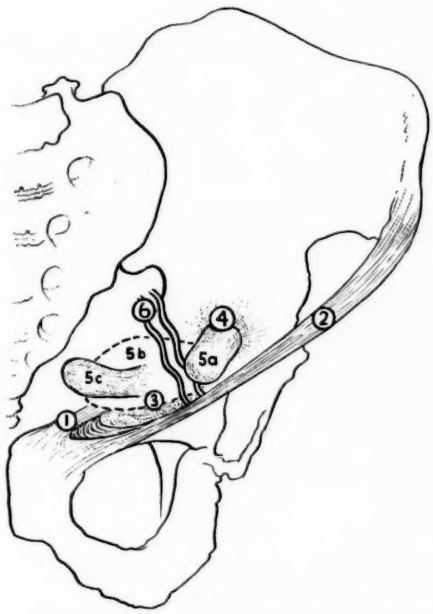

Fig. 2. Mobilization and conversion of multilocular hernial sac. Femoral locule inguinalized.

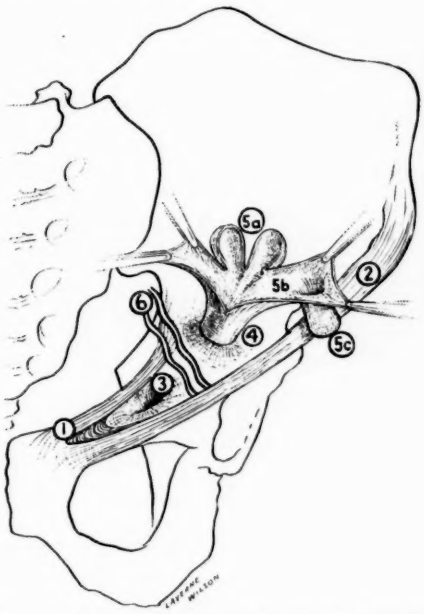

Fig. 3. Mobilization and conversion of multilocular hernial sac. Direct and femoral locules, indirectalized. 1, Iliopectineal ligament; 2, inguinal ligament; 3, femoral ring; 4, internal ring; 5, hernial sac; (a) indirect locule, (b) direct locule, (c) femoral locule; and 6, epigastric vessels.

5. Multiple interfascicular defects with fascial incompetency. One explanation offered for diverticular herniation is the sparsity of widely separated fasciculi of the internal oblique muscle and the coexisting interfascicular spaces in the middle aponeurotic stratum. If the spaces are large and the investing fascia bridging them velamentous, they become potential exits through which a hernia may protrude. Subperitoneal adipose tissue or a locule arising from the direct component of the sac may force itself through these vulnerable areas. Since diverticular hernias are prone to occur in the cranial portion of the wall they have been referred to as ventral inguinal hernias. However, diverticular hernias should be distinguished from spontaneous ventral hernias (Zimmerman et al.) and hernias of the linea semilunaris (Spigelius).

Peculiarly, the fascia transversalis frequently shares in the partial agenesis of the internal oblique muscle. Although Bassini, Halsted, Ferguson, and others (4, 5, 21, 26, 35) recognized this associated weakness they were more concerned with the potential weakness in the medial portion of the canal. The substitution of like generic tissue for the inadequate or missing stratum has long been recognized as fundamentally sound, but there is lack of unanimity as to the best technique in accomplishing it.

(a) The reflection of the anterior rectus sheath (Wœlfer, Bloodgood, Halsted (16), and Estes) and transfixation of its edge to the inguinal ligament was the favored technique for many years. Similarly the rectus flap has been sutured to Cooper's ligament. The objection to this type of maneuver is that a spindle shaped weakness is created between the rectus muscle and the medial margin of the flap, as only a thin posterior rectus fascia with no appreciable strength is left. When the fascial defect is narrow the rectus sheath can be incised medially; this allows the sheath to separate but the gap is protected by the underlying rectus muscle. The sliding graft of Fallis and Tanner obviates the criticism of the reflected flap.

(b) The patch graft of Kirschner, Singleton and Stehouwer, taken from fascia lata, and full thickness skin grafts of Mair have been used with varying results.

(c) A massive pedicled graft of the iliotibial tract, as advocated by DeGaray and Wangen-

steen, is a more formidable procedure but it is ideally suited to those cases with marked combined deficiency of the wall, and may be used when recurrences have followed other methods of repair.

Apart from the intrinsic causative factors of herniation, there are collateral or extrinsic factors which, if considered casually, may seem remotely related. I refer to systemic maladies such as asthma and chronic bronchitis, and to biologically inferior individuals. The surgeon, therefore, should possess not only the necessary anatomical and technical knowledge to treat hernia but also the ability to recognize the structural pattern, clinical habitus, and occupational requirements of the patient. Only by correlation of all factors, anatomical and constitutional, will we be able to come nearer to attaining our goal in herniology.

CONCLUSIONS

1. Reasons for the lack of general acceptance of Cooper's ligament hernioplasty have been enumerated.

2. The anatomical features and relationships of Cooper's ligament have been discussed and illustrated, and its strategic advantages in hernial repair have been pointed out. Similarly, its points of vulnerability and its technical hazards have been presented.

3. The criteria for guidance in the employment of Cooper's ligament have been proposed.

4. Efforts have been directed toward dispelling certain technical as well as morphologic misconceptions in regard to the saccular classification of hernias.

5. The dictum of digital exploration and consecutive removal of all variants of the sac, inguinalizing the femoral locule, and indirectalizing the other coexisting locules, is reaffirmed as being fundamentally important in the surgical treatment of hernia.

6. The correlation of the saccular and mural factors is essential in selecting the technique that offers the greatest assurance of a cure of the type of hernia at hand.

7. Certain extrinsic factors, including systemic maladies, the constitutional habitus, and the occupational requirement of the individual, should be evaluated before the selection of the most suitable repair, and these factors should play a role in the ultimate prognosis.

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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Reid, J. L., and McGuckin, F.: Cavernous Sinus Thrombophlebitis—A Report on 6 Consecutive Recoveries. *J. Lar. Otol.*, Lond., 1946, 61: 273.

The authors present the cases of 6 patients who recovered from cavernous sinus thrombophlebitis, merely to illustrate the improvement in prognosis with the use of penicillin and sulfonamides.

In conclusion they state that without suggesting that cavernous sinus thrombophlebitis has ceased to be a grave lesion, it is clear that the prognosis has radically altered. Intensive modern therapy, preferably combining sulfonamides and penicillin, is justified even when the case by previous standards appears hopeless. G. Albin Liva, M.D.

EYE

Kiskadden, W. S., and McGregor, M. W.: Coloboma of the Eyelids. *Plast. Reconstr. Surg.*, 1947, 2: 60.

The authors report a case of the relatively rare condition of bilateral congenital coloboma of the upper eyelids. The surgical treatment of this condition is not always easy, and if the results are inadequate or surgical correction is delayed, corneal scarring and impaired vision may result. This patient was one week old when first seen. In spite of frequent boric irrigations and adequate application of boric acid ointment, corneal ulceration gradually developed in both eyes during a period of 2½ months. At this time plastic reconstruction of the lids was done. The results were entirely satisfactory. The method of reconstruction was then compared with other methods of surgical correction of coloboma of the eyelids.

Roger H. Johnson, M.D.

Fox, S. A.: Lid Repair and Reconstruction. *Am. J. Ophth.*, 1947, 30: 190.

The author describes the reconstruction of an obliterated eye socket with epidermis. He points out that Wheeler first presented this method in 1921. After the eyelids are dissected from the orbital contents to the periosteum and behind the canthi, a dental compound is fitted into the socket. Around this stent, an epidermic graft is wrapped with its epithelial surface directed inward.

Instead of dental stents, Fox recommends the use of acrylic forms which range in size from 42 by 32 mm. to 38 by 22 mm. and are from 3.5 to 4 mm. in thickness. The most frequently employed form is the 38 by 28 mm. size. After all the fibrous and granulation tissue has been excised, epidermis approximately 3 by 4 in. in size and from 0.010 to 0.012 inch in thickness is cut from the inner middle aspect of the arm. The dermatome cement enables the graft to adhere to the form. The eyelids are not sutured together but a patch is applied, over which a firm pressure dressing is placed. The eye dressing is removed after 7 days and a pressure bandage is reapplied for five more days. The form is removed, the socket irrigated, and all excess epidermal tissue cleaned away. At the end of another week, a permanent prosthesis may be inserted.

Although the technique does not differ much from Wheeler's method, reconstruction is expedited and facilitated by the use of the acrylic forms. The graft obtained with the dermatome is uniformly thin and is a great improvement on grafts obtained with a knife. The latter contain sebaceous material and epithelial débris in which tears, mucus, and débris may collect and stagnate, and in which low grade infections may occur. Joshua Zuckerman, M.D.

Krewson, W. E., III: Surgical Methods of Treating Paralysis of the Superior Oblique Muscle. *Arch. Ophth.*, Chic., 1947, 37: 121.

The author describes various methods used in the surgical treatment of paralysis of the superior oblique muscle. He stresses the disadvantages of weakening a depressor muscle and believes that weakening an elevator muscle is preferable since the need for binocular vision is more pronounced in the lower field. The final criteria depend on the measurements in the individual case. Adequate diagrams are given.

Hunter H. Romaine, M.D.

Gibson, G. G.: Marginal Myotomy: Analysis of 22 Cases. *Arch. Ophth.*, Chic., 1947, 37: 175.

The use of marginal myotomy is advocated in the treatment of cases of concomitant strabismus of low degree in children in place of bilateral recession, according to the method of Chavasse. The operation is performed on each internal rectus muscle posterior to the tendon, which is said to produce a greater effect. Two incisions are placed in the margins of the muscle directly opposite to each other so as to cut all but the central 2 or 3 mm. of muscle.

Twenty-two patients have been operated upon by this method with what the author considers fair success, although several had recurrences. Orthoptic treatment was not employed.

William A. Mann, M.D.

Hughes, W. F., Jr.: Treatment of Lewisite Burns of the Eye with Dimercaprol ("Bal"). *Arch. Ophth.*, Chic., 1947, 37: 25.

The author discusses the factors concerned in the destructive lesions caused by lewisite burns of the

eye. A single instillation of dimercaprol solution or ointment within from 2 to 5 minutes after exposure to lewisite effectively prevents the development of serious ocular lesions. The method by which the drug works is described.

HUNTER H. ROMAINE, M.D.

Godtfredsen, E.: Ophthalmoneurological Symptoms in Connection with Malignant Nasopharyngeal Tumors. *Brit. J. Ophth.*, 1947, 31: 78.

The author indicates that the ophthalmoneurological symptoms in connection with malignant nasopharyngeal tumors occur both earlier and to a greater extent than is generally known, and that the ophthalmological symptoms predominate chiefly as ophthalmoplegia with or without attending trigeminal neuralgia. Patients suffering from this condition frequently will go first to the ophthalmologist which puts the diagnosis up to him.

HUNTER H. ROMAINE, M.D.

Gordon, D. M.: Ocular Sporotrichosis: Report of a Case. *Arch. Ophth.*, Chic., 1947, 37: 56.

The author reviews the literature on ocular sporotrichosis and reports a case in his own experience. He points out that 48 cases have been reported in the literature. Thirty-four were primary, and 15 were secondary to involvement elsewhere in the body.

The following parts were affected: the eyelids in 17 cases; the conjunctiva in 10; the lacrimal sac in 2; the conjunctiva and lacrimal apparatus in 1 case; the eyebrows in 1; the intraocular tissues in 5 cases; the orbit and eyelids in 5; the cornea in 3; the limbus in 1 case; the uveal tract in 1; and the lacrimal canal in 1. Ten of the cases occurred in the United States; most of the others occurred in France.

The disease responds to potassium iodide. A saturated solution is administered, beginning with 10 drops 3 to 4 times a day, which is increased by 5 drops per dose per day until the limit of tolerance has been reached. Treatment is continued for several weeks. Iodides stimulate the fibroblastic elements to proliferate and to encapsulate the sporotrichum.

JOSHUA ZUCKERMAN, M.D.

Samuels, B.: Proliferation of Lens Epithelium. *Am. J. Ophth.*, 1947, 30: 1.

The author believes that a strict differentiation between ectoderm and mesoderm cannot always be made. It is possible for the epithelial cells of the lens, when irritated, to lay down a tissue, the anterior-subcapsular cataract, that has physical qualities more of mesoderm than ectoderm. Following extracapsular cataract extraction, there may be a proliferation of germinal cells in Soemmerring's crystalline swelling or of the subcapsular epithelium to form the pearls of Elschnig.

The purpose of this article is to summarize the proliferation of the epithelial cells of the lens in 185 cases of nontraumatic cataracts. This did not include cases which may have had a rupture of the capsule since the author did not wish to have any in which other cells entered the discussion. He does not believe that cells pass through the lens capsule. He found that the greatest proliferation occurred in the cases with corneal scars and detachment of the retina and in cases of spontaneous iritis. The lenses that showed the least proliferation were found in the cases of intraocular tumors and glaucoma. He found that the proliferation of anterior capsular epithelium (subcapsular cataract) was most commonly central and that this was due to the absence of the protective influence of the iris. Subcapsular cataracts may also be excentric, equatorial, and posterior.

He found three types of anterior polar cataracts: the widespread type with an undulating anterior surface, the pyramidal type, and the thin fibrous type with sharp wrinkles in the capsule. He believes that they are made up of an "epithelial connective tissue." The pyramidal cataract was most frequently associated with corneal ulcers and was thought to be due to a short concentrated exposure to toxins. More extensive proliferation was characteristic of the cases of spontaneous retinal detachment. When the germinal cells have disappeared or have fallen away from the capsule, the anterior cells may take their place and grow backward to form one continuous layer of cells. Occasionally, the lens epithelium will attempt to repair an area of necrotic cells but being unable to do so forms a homogenous mass about this area. The proliferation of germinal cells usually occurred in liquefied lenses and was characterized by large bladderlike cells at the equator or along the posterior capsule. They frequently merged into large cystic spaces. Whenever a subcapsular cataract was found at the equator or posteriorly, it was considered to be a product of wandering anterior subcapsular cells.

Occasionally, the capsular cells elongated; in 2 cases drusen were found under the capsule and in 2 cases there were no epithelial cells. In 1 case the whole germinal zone was detached and floated about in the liquefied cortex.

ROGER H. JOHNSON, M.D.

Martin-Jones, J. D.: Uveal Sarcomas. *Brit. J. Ophth.*, 1946, 30: 3, Supp.

The author has written a monograph on the relatively rare condition of intraocular sarcoma. He believes that trauma and heredity do not play a part in the etiology, but that areas of pigmentation, pigmentary disturbances, areas of choroiditis, and hemorrhages in the macular region are factors. These tumors seem to be equally distributed between the two sexes. In this series the average age of incidence was 51.9 years, the youngest patient being 1½ years and the oldest 87 years. The author found that 38.5 per cent of the patients did not come for examination until their vision was nil, although 12.5 per cent still had useful vision.

He uses the customary procedure of dividing the course of an intraocular sarcoma into four stages: the quiescent stage, the stage of glaucoma, the period of perforation into the orbit, and the stage of generalized metastasis. The last stage may occur at any time.

He believes that in the majority of cases the diagnosis of intraocular neoplasm offers no special difficulty but that certain tumors are difficult to differentiate from primary glaucoma, idiopathic retinal detachment, choroidal detachment, senile macular exudative retinitis, hydatid cyst, benign melanoma, localized inflammatory conditions, and secondary tumors. He believes that in addition to a thorough history and complete examination of the eyes, certain points are of help in making the diagnosis. A detachment secondary to a tumor does not have a retinal hole; pigmented cells in the anterior chamber may indicate an intraocular tumor. Among these cases the intraocular pressure was elevated in 50 per cent and low in 3 per cent. However, other series were not as consistent. The author thinks that the use of the scleral puncture, scleral flap, and exploratory needle are unjustifiable.

Aids in diagnosis of the more difficult iris sarcoma were its limitation of the iris motility, its preference for the lower quadrants, its greater tendency to rise above the iris level, and its encroachment on the iris angle. Intraocular sarcomas are most common in the choroid, less frequent in the ciliary body, and rare in the iris. Bilateral sarcoma is extremely rare. In the choroid the tumor begins in the stroma, spreading between Bruch's membrane and the sclera. It then breaks through Bruch's membrane and expands rapidly into the vitreous forming the "collar stud" appearance with its central constriction. The tumor also tends to follow the perforating channels of the sclera into the orbit, and to metastasize by the blood stream.

The author uses the pathological grouping of spindle cell, round cell, spindle and round cell, epithelioid cell, and mixed cell types. The spindle cell type was the most common and the epithelioid cell type was rare. The mixed cell tumors were made up of all these types of cells and were the most fatal. The choroidal sarcomas were extremely vascular and were occasionally ossified. The origin of the melanoblasts is still undecided, but the author believes they are of both epiblastic and mesoblastic origin. He believes that the malignant melanoma is of mesodermal origin and therefore a true sarcoma.

The mortality rates showed that 27.9 per cent of the patients had died of sarcoma at the end of 3 years, 35.8 per cent in 5 years, and 55.5 per cent in 10 years. The author found that the patient was quite safe after 10 years. Intraorbital extension increased the mortality rates but involvement of the optic nerve or venous outlets did not. Patients under 30 years of age had a better prognosis. The author's findings tended to substantiate those of Callander and Wilder in that the patients with large amounts of reticulin throughout the tumor had a good prognosis.

The eye and the tissues immediately behind it should be removed as soon as the diagnosis has been made. In those cases of known extraocular spread, the statistics did not show any better results with exenteration than with radiation therapy. If the growth is in the patient's only eye, or if the patient refuses to have the eye removed, the author suggests the implantation of radon seeds into the growth or an iridectomy in the case of an iris tumor.

ROGER H. JOHNSON, M.D.

Weekers, L.: Adhesive Episcleral Reaction in the Operative Treatment of Retinal Detachment. *Brit. J. Ophth.*, 1946, 30: 715.

The author emphasizes the desirability of producing an adhesive episcleral reaction as well as an adhesive chorioretinitis in the operation for the correction of retinal detachment.

An incision was made through all layers of the eyes of rabbits and of human beings prior to enucleation with a very thin small cataract knife. Subsequent histological examination revealed the episcleral tissue to have entered the scleral incision and to have formed a union with the retina, which prevented a postmortem detachment at the points of perforation although the retina was elsewhere detached. This was true even when the eye was enucleated as short a time as 3 or 4 days after the puncture. Healing of the sclera itself was found to be slight or negligible.

From these experiments the author concludes that the episcleral reaction should be striven for in cases of retinal detachment to assist in holding the retina in position. This can be accomplished only if the sclera is completely perforated. While this can be most readily accomplished by a cataract knife it involves some risk of hemorrhage. The author therefore uses an ordinary angled and insulated diathermy needle 2 mm. in length and 0.15 mm. in diameter, and leaves the current on while inserting and removing the needle, the entire procedure requiring less than a second for each puncture. There should be no loss of subretinal fluid. The author favors the use of the nonperforating diathermic electrode prior to the perforations to promote a wide area of adhesive chorioretinitis. Following the multiple diathermic punctures the subretinal fluid should be evacuated. For this the galvanocautery is preferred, several short applications being made at the same spot, and exploration with a lacrimal probe is done if necessary.

WILLIAM A. MANN, M.D.

Levatin, P.: Atrophy of the Optic Nerve following Hemorrhage. *Arch. Ophth.*, Chic., 1947, 37: 18.

Amblyopia following an acute loss of blood occurs but rarely, an average of one case a year having been reported for the past 25 years. It seems probable that the pathogenesis of the condition lies in degeneration of the ganglion cells of the retina as a result of the ischemia, although there are numerous objections to this theory. In addition to the effect upon the ganglion cells there may be direct destruction of the optic nerve fibres in the region of the lamina cribrosa.

In the case reported by the author there was a massive hemorrhage from a duodenal ulcer in a 34 year old white man with reduction in hemoglobin to 25 per cent, with little improvement in the blood picture for 13 days, due to continued bleeding, in spite

of transfusions. Failure of the peripheral circulation was marked. There was a rapid onset of almost total optic atrophy in one eye with visual acuity reduced to light perception and a slow development of partial optic atrophy in the other eye with good central visual acuity and loss of three-eighths of the visual field. WILLIAM A. MANN, M.D.

Traquair, H.M.: Removal of the Wrong Eye. *Brit. J. Ophth.*, 1947, 31: 8.

The author directs attention to the most disastrous accident that can occur in ophthalmic surgery —removal of the wrong eye. It seems that the accident is not merely possible but that its prevention has occurred in the nick of time in every eye surgeon's experience, and removal of the wrong eye has actually occurred.

To avoid this tragic accident, which may occur most easily in cases of intraocular tumor, glaucoma, and sympathetic ophthalmia, the author suggests many precautions—marking the eye, preoperative examination of the patient by the surgeon personally immediately before the operation and before administration of a general anesthetic, and, especially, the use of local analgesia.

He further suggests that a paragraph on this vital subject should be included in every textbook in which removal of the eye is mentioned.

JOSHUA ZUCKERMAN, M.D.

Cutler, N. L.: A Positive Contact Ball and Ring Implant for Use after Enucleation. *Arch. Ophth.*, Chic., 1947, 37: 73.

The author describes a positive contact ball and ring implant for use after enucleation. A plastic sphere 20 mm. in diameter is used as the implant. It is narrowed anteriorly to permit the attachment of a metal ring approximately 19 mm. in diameter, to which the four rectus muscles are attached. The flattened anterior face of the implant has a depression into which a gold pin can be snugly fitted. The anteroposterior diameter measures only 15 or 16 mm. to make room for the artificial eye to fit in front of it. Later models have been made with holes drilled in the ring to allow tissue to grow through, and also with slight projections on the inner aspect to hold the muscles in place during operation.

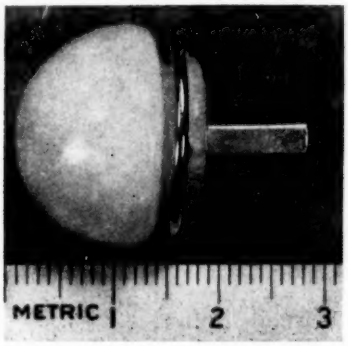

Fig. 1 (Cutler). Side view of implant with pin in place, which is later attached to the prosthesis, and the ring to which the rectus muscles are sutured.

The pin is attached to a plastic artificial eye. The diameter of the artificial eye is made to conform to the diameter of the other (normal) eye.

After enucleation is completed in the usual manner and the eye delivered, the implant is held in place by grasping the pin with forceps. Four silk sutures, which were inserted through the tendon of each rectus muscle, are now passed through the ring from below upward and sutured in their proper places. The tendon of the inferior rectus muscle is grasped with fixation forceps, and drawn until 4 mm. of the muscle are brought through the ring; it is then sutured so that it is looped around the ring. Double armed black silk sutures are passed through the conjunctival edge and through the anterior edge of Tenon's capsule, then carried under the ring and out through Tenon's capsule and the conjunctiva. After these sutures are tied, Tenon's capsule and the conjunctiva are rolled inward around the ring on themselves while the central part of the implant remains exposed. The pin is removed and a dressing applied. Sutures are removed on the twelfth day, and the prosthesis may be worn in from 18 to 21 days.

Cutler, who performed 22 operations of this kind, is of the opinion that this method gives the prosthesis a larger range and greater spontaneity of movement than are obtained with the older methods.

JOSHUA ZUCKERMAN, M.D.

EAR

Moorhead, R. L.: Fenestration for Otosclerosis: Report of 123 Cases. *Arch. Otolar.*, Chic., 1947, 45: 49.

It should be understood that there are three classes of patients on whom the fenestration operation has been performed. The first class includes otosclerotic patients with good hearing for bone-conducted sound. These are the ideal ones for fenestration, and of course should give the highest percentage of good results. The second class would comprise otosclerotic patients with marked nerve degeneration which has not, however, progressed to a sufficient degree to warrant the assumption that no improvement of hearing will be obtained. Included in this class are many patients from 40 to 58 years of age, who either know of someone who has had a good result or who, for one reason or another, wish to have the operation performed on the chance of improving their hearing. The third class includes patients with marked nerve degeneration who wish to take the chance, or on whom the otologist wishes to operate for one reason or another. Operation is perfectly justified in this last group for, if it is properly performed, even though no hearing improvement is obtained, these patients are in no way worse than before

the operation. In all classes one usually operates on the poorer ear so that if no improvement takes place, one does not further handicap the patient.

In favorable cases, poor results seem to be from two main causes: (1) closure of the new window by formation of new bone or by development of fibrous tissue, or both; (2) secondary postoperative serous labyrinthitis—a reaction which takes place to some extent in every case in which the membranous labyrinth is exposed. In a general way, the younger patients seem to be much more prone to have the window close by bone regeneration than patients in the older brackets. This can be readily understood when one considers that the processes of bone repair are much more active in the young. Closure of the new window can be caused by formation of new bone or by the development of fibrous tissue, or by both, and it is often not possible, from a clinical standpoint, to determine accurately whether the closure is due to one or to the other condition.

There have been no cases in which permanent facial paralysis resulted, but there have been 2 cases in which transient facial paresis was produced.

There was a single case in which postoperative perichondritis was observed.

There have been no cases in which vertigo was persistent. The postoperative disturbance of equilibrium has usually disappeared promptly, but one patient had some disturbance for about 2 months.

In spite of most careful operative technique and postoperative care, there have been occasional cases in which the discharge from the ear persisted.

Of the 123 consecutive patients operated on, 39 failed to recover satisfactory hearing for any of the three tones (512, 1024, 2048), and in these the results should be regarded as failures.

In spite of the fact that 29 per cent of the patients in the series failed to recover any hearing, only 5 had the hearing diminished below the preoperative threshold. JOHN F. DELPH, M.D.

Lindsay, J. R.: Effect of Obliteration of the Endolymphatic Sac and Duct in the Monkey. *Arch. Otolar.*, Chic., 1947, 45: 1.

The discovery by Hallpike and Cairns that the clinical syndrome known as Ménière's disease is based on anatomicopathological changes in the inner ear, the most striking of which is dilatation or hydrops of the endolymphatic system, has directed attention to the physiology of the secretion and the maintenance of endolymph.

Various hypotheses have been proposed to explain the hydrops. On the basis of the histological appearance, Hallpike and Cairns have postulated an interference with resorption of endolymph due to decreased vascularity of the perisaccular connective tissue. The histological study in other cases has not been consistently abnormal.

Seven experiments were performed on monkeys to determine the various degrees of destruction of the sac and duct. After operation the animals were observed for gross disturbance of equilibrium and the ears were sectioned for histological examination at varying periods up to 3½ months. The endaural approach was used in all 7 ears, and the technique is described in detail.

The author's comments and conclusions are as follows:

In 3 ears not more than exposure and possibly simple drainage had been accomplished. In one ear the sac and major portion of the medial dilatation (sinus II) were destroyed. In one there was complete destruction of the sac and sinus II plus accidental opening of the posterior semicircular canal. In 2 ears the sac and sinus II were completely destroyed without operative injury of other labyrinthine structures.

None of the animals was observed to have any gross disturbance of equilibrium on the day following operation or afterward. No nystagmus was observed after the animals were completely out from under the anesthetic.

Pressure exerted in the cavities over a temporary pack at operation in some of the ears produced no conjugate deviation of the eyes such as occurs routinely when a fenestra is made in a semicircular canal without injuring the membranous canal. No infections were found in the middle ear, the mastoid process, or the labyrinth. Osteogenesis had progressed to varying degrees in the callus filling the operative defect. The membranous structures were well preserved. In all the ears the cochlear duct, the saccule, the utricle, and the membranous canals showed no abnormality of contour that could not be explained as postmortem artefact, with the exception of one ear in which the posterior canal was injured at operation.

The sensory apparatus and neural elements appeared normal in all except the single ear in which the otolithic membrane was elevated from the saccular macula. The stria vascularis appeared normal in all ears as did also the cells of Hensen and Claudius.

These experiments demonstrate that in the monkey's ear the maintenance of a normal quantity of endolymph is not dependent on the existence of the endolymphatic sac or the more differentiated medial dilated portion of the duct. While the histological structure of this part of the duct, consisting of cuboidal epithelium, rugose walls, and surrounding vascular connective tissue, has suggested a probable function, in the removal of endolymph it now appears that this structure is not essential for the performance of this function.

While the proximal dilatation at the junction of the utricular and saccular ducts (sinus I) along with a portion of the narrow part leading from it were not destroyed in these experiments, the lining in the proximal dilatation consists of an extension of the single layer of flattened cells lining the saccular and utricular ducts and assumes a cuboidal character only as the duct enters sinus II. The vascularity of the surrounding connective tissue becomes a feature only in the region of sinus II. It appears unlikely, therefore, that the portion of the duct which was not destroyed possesses any specialized function in the control of endolymph.

The fact that obliteration of the endolymphatic duct to this extent did not appreciably affect the volume of endolymph in the remainder of the system in a period of 3½ months rules out the hypothesis that hydrops of the labyrinth can be attributed to impairment of function of this structure.

JOHN F. DELPH, M.D.

NECK

Seidlin, S. M., Marinelli, L. D., and Oshry, E.: Radioactive Iodine Therapy. *J. Am. M. Ass.*, 1946, 132: 838.

A patient was completely thyroidectomized for malignant adenoma in 1923, and 15 years later hyperthyroidism and severe back pain developed. In October, 1939 a pulsating metastatic thyroid adenocarcinoma was removed from the region of the twelfth thoracic vertebra. The hyperthyroidism continued to progress for the next 2 years, and metastases were demonstrated with x-rays in the lungs, the right femur, the second rib on the left side, the left ilium, and the skull. Roentgenological therapy was ineffective. In March, 1943 a tracer dose of radioiodine was shown to be taken up by all the metastases. Between May and August, 1943, a total of 102 millicuries of I^{130} (half-life 12.6 hours) and 20.5 millicuries of I^{131} (half-life 8 days), prepared in a cyclotron by bombardment of tellurium with deuterons, was given as sodium iodide in water. The estimated dose to the tumors was 10,600 equivalent r. and to the blood 70 equivalent r.

Most of the radioactive iodine was taken up by the metastases. Time concentration curves were constructed for the tumor, blood, and urine. Additional treatment in April, 1944 and March, 1945 resulted in relief of the pain, and the patient was in good condition at the time of the report.

CLINTON H. THIENES, M.D.

Bartels, E. C., and Bell, G. O.: Thiouracil. Preoperative Use in 400 Patients with Severe Hyperthyroidism. *West. J. Surg.*, 1947, 55: 39.

Thiouracil was used during the last 3 years in the preoperative treatment of 400 patients with severe hyperthyroidism. These patients represent about 35 per cent of all patients having thyroidectomy for hyperthyroidism. All patients were not prepared with thiouracil therapy. Three hundred thirty-eight cases were classified as primary hyperthyroidism, and 62 were classified as toxic adenomatous goiters. Table I shows the breakdown of evidence of severe hyperthyroidism. Table II shows a breakdown of the significant complicating diseases in 400 cases.

Thiouracil was administered in a total daily dose of 0.6 gr. It was found that full control of hyperthyroidism is essential before thyroidectomy. If full control does not take place, then any of the usual complications may arise. Thiouracil treatment should be individualized. Roughly, it was found that 1 day of thiouracil treatment was needed for each percentage elevation in the basal metabolic rate. A patient with primary hyperthyroidism of short duration, and one who has had no iodine, will have a daily drop of about 1.3 per cent in basal metabolism. Patients with primary hyperthyroidism of long duration or of short duration, who have received iodine therapy, will have a daily drop of 1 per cent in basal metabolic rate.

Patients with adenomatous goiters, who have had no previous iodine therapy, will show a 0.64 daily drop in the basal metabolic rate; patients with adenomatous goiters who have had previous iodine therapy, will show a 0.45 daily drop in the basal metabolic rate. At surgery, the thyroid gland was found to be very soft and vascular when only thiouracil had been given preoperatively. To overcome this difficulty, Lugol's solution was combined with thiouracil, thus making the surgery more satisfactory. Table III shows the reaction to thiouracil in 400 cases. A total of 35 cases showed white blood cell depression, fever, skin eruption, edema of the skin or swelling of the salivary glands. A chart is included, which shows the time of reaction to thiouracil. The time of onset of reactions varied widely except for the fever reaction which occurred on the ninth or tenth day. Both total and differential counts are necessary, and these are repeated at 7 to 10 day intervals during thiouracil therapy. When agranulocytosis develops, energetic penicillin treatment is advised as protection against infection during the vulnerable period. Of 12 patients sensitive to thiouracil, 11 tolerated thiobarbital. The advantages of thiouracil preparation are that the patient is restored to a normal state of health for thyroidectomy, the need of multiple stage operations is eliminated, and the treatment has practically abolished mortality. Also, the postoperative course of the thiouracil-treated patient is less stormy.

Two hundred sixty-six patients have been followed from 6 months to 2 years following thyroidectomy. Among these there have been 5 cases of recurrent hyperthyroidism; 8 patients have persistent postoperative myxedema; there have been 3 cases of unilateral cord paralysis; and 3 patients have developed progressive exophthalmos. There was 1 postoperative death and 1 death from agranulocytosis due to thiouracil, a mortality of 0.5 per cent.

RICHARD J. BENNETT, JR., M.D.

Rose, E., and McConnell, J.: Thiouracil in Thyrotoxicosis—Results of Prolonged Treatment in 35 Cases. *Am. J. M. Sc.*, 1947, 213: 74.

The authors' patients were under observation for from 10 to 30 months. On the basis of results, they were grouped as follows:

Group 1 includes 16 patients in whom sustained remission followed the cessation of thiouracil therapy. There were 15 females and 1 male. Three patients were in the second decade of life, 1 patient was in the third, 3 patients in the fourth, 6 in the fifth, 2 in the sixth and 1 patient in the seventh decade. Thirteen patients were under observation for 1 year or more, and 8 for more than 2 years. There were 15 with diffuse goiter and 1 with nodular goiter. The longest period of treatment with thiouracil was 10.8 months.

Group 2 comprises 13 patients, as follows:

(a) Nine patients who have remained in remission during the administration of small doses of 0.1 to 0.2 gm. daily, but who relapsed when the drug was withdrawn. Of these, 1 was a male and 8 were females; the majority were less than 40 years of age. The average duration of thiouracil administration was 1 year, and the longest 19.5 months. Three of the patients developed moderately severe signs of edema and congestion of the lids and conjunctiva, and 2, exophthalmos.

(b) Two patients who relapsed when the dose was reduced to 0.2 gm., both of whom had nodular goiter.

(c) Two patients were maintained on small doses, without relapse. The first patient was a woman, aged 69, with nodular goiter, diabetes mellitus, moderate hypertension, congestive heart failure, and a basal metabolic rate of plus 46 per cent. Thyroidectomy was performed at the end of 11 months because of pressure symptoms. The second patient was a man, aged 22, with an initial basal metabolic rate of plus 59 per cent and a diffuse goiter. His goiter decreased in size over a period of 8 months.

Ten of the 13 patients in group 2 were in the third and fourth decades of life, and 3 were in the sixth decade. Eight had diffuse goiter, 2 nodular, and 3 recurrent postoperative goiter.

Group 3 comprises 6 patients (1 male and 5 females) who failed to show satisfactory response over periods of 7 to 15 months. Five patients were above 44 years of age; 4 had a complicating disease, such as acromegaly, hypertension, myocardial enlargement, diabetes, epilepsy, and auricular fibrillation.

Five of the 35 patients in the present series exhibited a leucopenia of less than 4,000 white cells per cubic millimeter. One of these, following a period of abstinence, exhibited no recurrence of leucopenia when the drug was readministered. One had leucopenia several months after cessation of therapy; this was thought to be due to the hyperthyroidism rather than the therapy. One patient had a severe granulopenia, pharyngitis, and fever. One developed maculopapular dermatosis. CLINTON H. THIENES, M.D.

Lahey, F. H.: Surgery of the Thyroid Gland. *N. England J. M.*, 1947, 236: 46.

The author's review is based on his experience with between 25,000 and 26,000 operations on 22,000 to 25,000 patients with thyroid disease, during a period of 30 years. The operative mortality was 0.73 per cent and the patient mortality, 0.88 per cent. Thiouracil, thiobarbital, and propylthiouracil have been used preoperatively in a recent series of 500 cases, with a patient mortality of only 0.17 per cent. The author believes that these drugs interfere with the elaboration of thyroxine by the thyroid gland, but states that the action of administered thyroxine is not altered. At operation, however, the gland is very friable and microscopically has the typical appearance of a toxic, hyperplastic gland, unless iodine is given the last 3 weeks before surgery, when the hyperplasia regresses.

At the Lahey clinic, Boston, it is now the practice to discontinue thiouracil 1 week before surgery, to avoid the possibility of agranulocytosis at the time of surgery. The average stay in the hospital before the thiouracil era (with iodine treatment preoperatively), was 55 days for the 3 stage operation, and 35 days with the two stage operation. With thiouracil and iodine the average stay is 8 days.

Complications due to these drugs are as follows: neutropenia, granulocytopenia, fever, skin eruptions, and enlargement of the salivary glands. These occur in 9 per cent of patients receiving thiouracil and in 28 per cent of those treated with thiobarbital. Experience with propylthiouracil included 60 patients submitted to surgery and 100 in preparation, with 2 showing leucopenia. When these complications occur, and the drug is withdrawn until disappearance of the complication, readministration of the drug is associated with a greater hazard of recurrence. Agranulocytosis and neutropenia occurred as late as 8 days after the last dose of thiouracil, and as late as 9 months after beginning administration on as low a daily dose as 0.2 gm. Agranulocytosis is treated with penicillin, pyridoxine, and liver extract, with the greatest dependence on penicillin.

Apathetic hyperthyroidism is described as a chronic, low grade hyperthyroidism in older people, usually with only a small increase in basal metabolic rate, with myasthenia and loss of weight. Subtotal thyroidectomy results in recovery.

The importance of subtotal thyroidectomy in "thyrocardiac disease" is emphasized.

Other phases of hyperthyroidism discussed are myasthenia, exophthalmos, diminished liver function, cancer of the thyroid, variations in relations of recurrent laryngeal nerve, intrathoracic goiter, and the use of lipocaic in the control of diarrhea associated with hyperthyroidism. CLINTON H. THIENES, M.D.

Figi, F. A.: The Etiology and Treatment of Cicatricial Stenosis of the Larynx and Trachea. *South. M. J.*, 1947, 40: 17.

In a group of 42 cases of cicatricial stenosis of the larynx and trachea, fracture of the cartilages and previous removal of tumors were the most common causes of stenosis. Other less frequent causes were acute infections, self inflicted and accidental severing of the trachea, and the use of nasal feeding tubes.

The stenosis was treated by an open operation; that is, by thyrotomy, excision of the scarring, and skin grafting in 27 cases, by continuous dilatation with or without incision of the scar in 10 cases, and by repeated incision of the cicatricial diaphragm in 2 cases. The treatment is described in detail.

Prolonged dilatation was carried out in all the cases after skin grafting.

In 24 of the 27 patients treated by skin grafting the lumen is ample, and in 22 patients the tracheotomy opening has been closed. In 8 of the 10 patients who were treated by continuous dilatation, decannulation has been carried out. Both of the patients who were treated by repeated incision of a cicatricial diaphragm have, at the time of this report, a free airway.

Clerf, L. H.: Keratosis of the Larynx. *J. Am. M. Ass.*, 1946, 132: 823.

Keratosis of the larynx exists in all grades from simple diffuse hyperplasia to papillomatous masses which fill the larynx. Carcinomatous ulceration may be seen. Other terms for the condition are hyperkeratosis, leukoplakia, and pachyderma laryngis. It is usually a localized benign hyperplasia of epithelium which does not invade the inflamed submucosa. Smoking seems to be commonly associated, and vitamin A deficiency may be a contributing factor. The disease is especially important because of the occurrence in some patients of "precancerous" lesions or true carcinoma. The principal symptom is huskiness or hoarseness of the voice. Patients without evidence of cancer should be observed, smoking stopped and vitamin therapy instituted. Surgical removal of keratotic material may be required. More radical surgery is demanded by extensive keratosis or by cancer.

CLINTON H. THIENES, M.D.

Sprindrich, J., and Hladky, R.: The Treatment of Carcinoma of the Larynx. A Comparison of the Results of Surgery and of Irradiation Therapy by the Method of Coutard (Léčeni rakoviny hrtanu. Srovnání výsledků léčenim operativníma ozařováním metodou Coutardovou). *Lek. listy*, 1946, 1: 440.

In 140 cases of cancer of the larynx, treated by all forms of irradiation therapy and by surgery from 1935 to the end of 1944 in Brno, there were 49 cures (35 per cent). Surgery cured 71.4 per cent of the patients, and irradiation cured 19.3 per cent, including both operable and inoperable cases. Since 1939, when Coutard's method began to be used exclusively the percentage of cures by irradiation therapy rose to 25 per cent. However, when the percentage of cures for the method of Coutard is calculated on the basis of operable cases it rises to about 80 per cent.

These experiences and a study of the literature convince the authors that irradiation therapy is of great value in the treatment of cancer of the larynx. In 1935 they treated only inoperable cases with irradiation methods, while in 1945 they treated the intralaryngeal growths by the Coutard method, reserving the cases in which the new growth had penetrated the cartilage for laryngeal fissure. It is true that intralaryngeal surgery is still used, but irradiation therapy is gaining more and more favor, especially because of the better functional results. Of the irradiation methods, that of Coutard has become the treatment of choice. However, the authors believe from their experience that when the tumor has passed the cartilage, it is no longer curable by irradiation methods.

An improvement in results can, in the authors' opinion, still be achieved by a closer co-operation of all the services—laryngological, surgical and irradiation, by making an early diagnosis, by more exactly placing the indications in the individual patient, and by perfecting all methods of treatment to the point where the results attained will no longer be a matter of chance, but a matter of certainty.

JOHN W. BRENNAN, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Fabing, H. D.: Cerebral Blast Syndrome in Combat Soldiers. *Arch. Neur. Psychiat.*, Chic., 1947, 57: 14.

The author presents a detailed study of 80 cases of blast injury which occurred in combat troops. The unconsciousness following such explosions was characterized by retrograde amnesia for the blast and a period of anterograde unconsciousness, for a period of about one hour. This unconsciousness was usually marked by aimless dissociated behavior. The chief complaints following recovery of consciousness were diffuse anxiety symptoms and a nonspecific headache. There were no constant physical or neurological abnormalities. Spinal fluid studies failed to reveal any deviations from the normal except in a few patients (2.5 per cent) in whom intrathecal bleeding had occurred.

Various types of therapy were attempted. Memory during the unconscious period was found to be intact under chemical hypnosis. It was noted that if a conscious recall of this material could be accomplished, the blast injury symptoms were ameliorated or entirely removed. This was best done by the use of intravenous sodium pentothal in developing and exploring the amnesic experiences. The patient was then suddenly awakened by the intravenous injection of coramine, and the amnesic details were discussed. This method proved of definite therapeutic value in 90 per cent of the patients.

Several detailed case reports are given, as well as a general discussion of the literature pertinent to blast injury. C. FREDERICK KITTLE, M.D.

Pitts, W. R.: War Wounds of the Ventricles of the Brain. *Am. J. Surg.*, 1947, 73: 3.

This report deals with penetrating wounds of the cerebral ventricular system as seen and treated in an evacuation hospital. In this hospital which received 10,455 casualties, there were 108 penetrating wounds of the brain and 16 of these involved the ventricles. Of the latter group 3 led to death without any surgical procedure; 13 underwent surgery.

The 3 patients who died without surgical treatment presented deep coma, rapid stertorous respiration, rapid pulse, wide pulse pressure, and unilateral pupillary dilatation. Decerebrate extensor spasm was present in 2 cases and flaccidity in 1 case. There were large intraventricular hematomas in 2 cases.

Of the group of 13 patients who lived long enough to undergo surgery, all were unconscious immediately and remained so for from 30 minutes to 5 days. Nine showed a moderately widened pulse pressure. Bradycardia was present in only 2, both of whom had large intraventricular hematomas, a wide pulse pressure, and a tight brain. Localizing neurological signs were of no aid in diagnosing involvement of the ventricles. Only in 1 case was there sufficient cerebrospinal fluid loss to implicate the ventricles. In 6 cases it was possible to diagnose penetration of the ventricles by the x-ray findings and location of the wounds.

The operations were done under local anesthesia, in some cases supplemented with pentothal. All patients received morphine preoperatively. At operation there was a large variety of findings. No ventricles contained metallic foreign bodies, but some contained bone fragments. There was extensive damage to gray and white matter, and in 1 case the corpus callosum was damaged. Damaged tissue and foreign material were removed along the course of the projectile. Irrigation was kept to a minimum so that blood clots and foreign matter would not be washed into inaccessible regions of the ventricles. Complete hemostasis was obtained. Living fascial or periosteal grafts were used in the closure of most of the cases. Just prior to closure of the dura, some form of bacteriostatic agent was used locally—either penicillin or sulfanilamide. Some patients were given sulfadiazine and penicillin systemically, and some received penicillin intrathecally.

There were 2 deaths among the 13 patients, a mortality of 15.4 per cent. The mortality in brain wounds when the ventricles were spared was 6.7 per cent. Intracranial infection was not a factor in any of the deaths. DANIEL RUGE, M.D.

Wertheimer, P., and Barrié, J.: Cranioplasty with Free Osteoperiosteal Grafts. Observation of 11 Cases (La crânioplastie par greffons ostéo-périostiques libres, à propos de 11 observations). *J. chir.*, Par., 1946, 62: 421.

Interest in cranioplasty for the repair of large cranial defects always increases during the time of war. Such was the case during the first World War, as well as again after the recent war, but between these two periods interest in cranioplasty lagged. The authors have not had the advantage of using tantalum, but they are well aware of its wide and successful use in the hands of American neurological surgeons during the last war and in the months succeeding it.

They have found a simple method of autogenous bone grafting to be useful. Although it is not a new procedure either in France or America, it seems to be an entirely feasible and effective form of closing certain types of cranial defects. They used it in 11 cases. They turn down a generous scalp flap about the cranial defect, making sure that the flap has a wide and well vascularized pedicle. Ample normal bone and periosteum about the defect are exposed. The underlying brain and dura mater may then be inspected, and the dura mater, freed from the edges of the bone defect, may be repaired with a fascial graft if that is necessary. With a chisel small "mosaics" of bone are removed from the outer table of the surrounding nor-

mal calvarium. These pieces of bone are placed free upon the exposed dura mater, but they do not necessarily cover the dura completely. The scalp flap is then carefully replaced and sutured in two layers without drainage.

The authors feel that in 9 of their 11 patients they have had definite success. They believe they have seen such complaints as headache, vertigo, and mental changes improve and disappear after cranioplasty. Follow-up roentgenological studies of the repaired defects show that the grafts melt away into a general sheetlike mass of ossification. Their method of cranioplasty is obviously a less expensive one than that which requires the use of tantalum or silver plates.

JOHN MARTIN, M.D.

Estella, J.: Surgical Treatment of Facial Paralysis by Resection of Upper Cervical Sympathetic Ganglion (Tratamiento quirúrgico de la parálysis facial y resección del ganglio cervical superior del simpático). *Rev. espan. cir.*, 1945, 1: 283.

For cosmetic reasons facial paralysis may demand a corrective operation, especially in young women. Imperfect protection of the eyeball caused by lagophthalmos may also require an operation. Only in facial paralysis of the peripheral type is an operation justified. It goes without saying that only permanent changes form an indication for operation because in many instances the paralysis recedes in the course of time. Therefore, tests with the faradic current and an examination of the patient under anesthesia are imperative: absence of response to the electric current indicates an irreparable anatomic interruption of the nerve. Absence of response to a galvanic current indicates definite muscular degeneration and contraindicates surgical treatment because the muscles have lost their contractility.

Three groups of operations are at the disposal of the surgeon: (1) restoration of the continuity of the nerve trunk by decompression or direct suture of the nerve, (2) re-establishment of the lost motor function by utilization of the activity of intact muscles by myoplastic procedures or neuroanastomosis, and (3) resection of the upper cervical ganglion of the sympathetic system. The first two groups of operations have a limited field of usefulness and their results are not infrequently disappointing.

The technique of resection of the upper cervical ganglion is much simpler than that of resection of the stellar ganglion. The author uses the retromastoid approach. The ganglion is easily accessible upon the prevertebral aponeurosis at the level of the transverse apophysis of the second or third cervical vertebra. The retromastoid route is preferred to the premastoid approach by the author because the scar is less visible and because, contrary to the prevailing opinion, the exposure of the ganglion is better. The incision through the skin is made along the upper two-thirds of the posterior border of the sternocleidomastoid muscle.

In a 54 year old woman who developed a facial paralysis of the peripheral type following a skull fracture, the lagophthalmos disappeared completely following the operation and the facial muscles recuperated. The correction of lagophthalmos may be attributed to the postoperative contracture of Hörner's muscle. The effect on the facial muscles may be ascribed to vasomotor and trophic modifications caused by the sympathectomy. In addition to it, compensatory kinetic mechanism may play a role.

The author concludes that a resection of the upper cervical ganglion is indicated whenever facial paralysis is permanent and a direct suture or plastic restoration of the nerve cannot be considered because the lesion is intracranial, or because the entire extrapetrous portion of the facial nerve is destroyed. In selected cases sympathectomy may be employed also, as a preliminary or supplemental operation.

JOSEPH K. NARAT, M.D.

SPINAL CORD AND ITS COVERINGS

Brazier, M. A. B., Watkins, A. L., and Michelsen, J. J.: Electromyography in the Differential Diagnosis of Ruptured Cervical Disc. *Arch. Neur. Psychiat.*, Chic., 1946, 56: 651.

The electromyograph has been used as an instrument to detect fasciculations of muscles so fine that they are not visible to the eye. Electromyography for the detection of such fasciculations in muscles, due to lesions of the spinal cord and peripheral nerves, has been used for some time.

In the present report, 10 cases of suspected compression of the nerve roots by protruding intervertebral discs have been reviewed in the light of their electromyographic findings.

Surface electrodes were used and numerous shiftings were made to find the optimum site for recording the impulses. Multiple spontaneous discharges, presenting clear cut diphasic spikes, were observed in certain muscles and not in others. The muscles showing such abnormality were then classified with regard to their nerve root innervation. By such means the suspected nerve roots were identified as having abnormal reactions.

These studies were conducted in 10 cases, and, of these, 9 were operated upon. In 2 cases with suspected ruptured cervical discs, a normal electromyogram was found, and at operation no lesion was observed. In other instances, an accurate root localization was obtained by the electromyographic readings, and confirmed at operation.

A differential point between recordings of impulses from muscles in cases of root compression and those in cases in which there is a degenerative process of the anterior horn cells such as progressive muscular atrophy is also discussed.

HOWARD A. BROWN, M.D.

Nissim, J. A.: Spinal Washouts in Purulent Meningitis. *Brit. M. J.*, 1947, 1: 176.

Eight cases of purulent meningitis of varying etiology are presented, in which repeated spinal washouts were performed by the single needle method of

spinal lavage. The spinal washouts were done with the idea of preventing or combating the arachnoiditis and the formation of plastic exudates which are natural sequelae of the meningitis.

A one-needle technique is described in which a lavage apparatus consisting of a vacoliter of Hartman's solution is connected by a rubber tube with clamp to a 20 c.c. syringe barrel, which in turn is connected to the lumbar puncture needle. Irrigations are performed with amounts of 20 c.c. until the returning fluid is clear. Following the irrigation, penicillin is instilled intrathecally in therapeutic doses.

The effectiveness of the spinal washout is demonstrated by cell counts on the spinal fluid that is removed. The author has worked out what he calls a cerebrospinal fluid cellular clearance showing that the washouts resulted in a lowering of the cell counts of the cerebrospinal fluid and also decreased the cerebrospinal fluid pressure. As many as 6 or 7 washouts were done daily in some cases.

Untoward reactions, such as herniation of the cerebellar tonsils from increased intracranial pressure, are discussed and the author believes that the danger of herniation in uncomplicated meningitis has been unduly exaggerated. Headache was obviated by warming the irrigating fluid to body temperature.

In 2 of the 8 cases reported the patient died of the meningitis; another died of other causes. In the 5 cases in which the patient recovered, no mention is made of any sequelae. The author concludes by stating, "Apart from clearing pus and organisms and restoring osmosis to normal, the irrigating fluid may break up commencing adhesions, and the cerebrospinal fluid pressure is kept down."

HOWARD H. LANDER, M.D.

PERIPHERAL NERVES

Wertheimer, P.: Effects of Vascular Lesions on Peripheral Nerve Lesions (Effets des lésions vasculaires sur les lésions nerveuses périphériques). *Lyon chir.*, 1946, 41: 385.

In this article the author stresses the neurological sequelae of vascular injuries and emphasizes the importance of the blood circulation in nerve trunks. Four cases are discussed in which peripheral nerve lesions are associated with traumatic vascular lesions.

The first patient had received a gunshot injury in the left subclavicular region with fracture of the scapula at the point of exit and presented a complete paralysis of the lower brachial plexus. Electrodiagnostic tests showed diminished excitability but no reaction of degeneration in the muscles of the entire upper extremity. There was an anesthesia of the hand and inferior portion of the forearm and massive atrophy of the entire extremity including the intrinsic hand muscles. At operation the nerve trunks were found to be intact but the axillary artery showed a traumatic obliteration; an arteriectomy was performed. The patient's condition improved greatly but a year later he continued to show the signs of a median nerve paralysis.

The second patient presented a high radial nerve paralysis due to a gunshot injury of the axilla. The operation disclosed intact nerve trunks and an aneurysm of the axillary artery which was resected. Ten months later the patient showed a residual paresis of the common extensors of the fingers and of the extensors and abductor of the thumb.

The last 2 cases presented definite causalgic symptoms with paralysis and sensory disturbances, one in the right upper extremity and the other in the left lower extremity. At operation adherence of the brachial artery to the median nerve and complete occlusion of the femoral artery were found, respectively. Following periarterial sympathectomies the causalgic symptoms disappeared and the motor disturbances receded gradually.

Peripheral nerve lesions attributed to primary vascular lesions and ischemia need careful investigation and study. The evaluation of the neurologic signs is often very difficult in the presence of a nerve lesion associated with vascular disturbances. Very little is known about the blood circulation of the nerves, although it has been shown by Holmes, Highet, and Seddon in a recent report that peripheral nerves undergo degenerative and mesodermal proliferative changes, and even complete necrosis, in purely ischemic lesions due to disturbances in their blood supply.

GEORGE PERRET, M.D.

SYMPATHETIC NERVES

Laborda, F. M.: Splanchnicectomy and Hydronephrosis. Principles and Indications (Esplacnicectomía e hidronefrosis. Fundamentos e indicaciones). *Rev. españ. cir.*, 1946, 3: 23.

The neurosurgical treatment of dilatation of the urinary excretory ducts should be confined to cases of functional or idiopathic dilatation in which the action of the sympathetic nervous system appears disturbed.

All 10 patients operated on by the author showed painful phenomena and had considerable amelioration of their symptoms or complete recovery after the operation.

A temporary disappearance of symptoms may be obtained by the inject on of an anesthetic into the splanchnic system but permanent results can be expected only from an operative procedure such as denervation of the renal pedicle, splanchnicectomy, extirpation of the external portion of the semilunar ganglion, removal of the aortorenal ganglion, section of the minor splanchnic nerve, or extirpation of the first sympathetic ganglion of the lumbar chain.

The relief of pain after the operative procedures is attributed by the author not to the interruption of the sensory paths but to the cessation of the spastic effect of the sympathetic system.

In 4 cases of infectious hydronephrosis, the pains subsided after the operation and considerable improvement in regard to the infection was noticed, the latter being due to the elimination of urinary retention. A recurrence of the infection, but not

pain, brought 1 patient back to the hospital after a splanchnicectomy performed for an infectious bilateral hydronephrosis. The analysis of the urinary sediment disclosed the presence of Koch's bacilli. The author concludes from this observation that no effect of splanchnicectomy on tuberculosis of the kidneys can be expected as far as the specific infection is concerned.

In regard to the effect of splanchnicectomy on the amount of dilatation of the renal pelvis and calices, no change has been noticed in 5 cases, but the dilatation increased in 1 case of bilateral tuberculous hydronephrosis and decreased in 4 cases.

In 3 cases the author performed an extirpation of the aortorenal ganglion or a denervation of the renal pedicle. After the operation the pains stopped but the morphologic changes remained stationary. The best results were obtained from splanchnicectomy combined with extirpation of the external horn of the semilunar ganglion and of the first ganglion of the lumbar sympathetic chain. In all such cases the relief of pain was accompanied by an objective improvement in the form of a diminution of organic lesions.

An infiltration of the splanchnic nerve is useful as a test; if a transient improvement is obtained, an operation is justified. In 1 case of bilateral hydronephrosis the author successfully employed splanchnicectomy on the more affected side and injection of an anesthetic on the other side.

There are three methods of approach to the splanchnic nerve: the posterior mediastinal approach, the infrapleural route, and the lumbar subdiaphragmatic method, which the author prefers to the other two. Although the wound is deep and it is difficult to employ local anesthesia, pleural irritation is avoided and the approach offers the opportunity to examine the suprarenal glands and, if desired, to extirpate the semilunar ganglion, the aortorenal ganglion, or a part of the sympathetic chain. In addition, the last mentioned method allows the performance of supplementary operations on the kidneys, such as exploration, decapsulation, and suspension.

The author did not perform a bilateral resection of the splanchnic nerves.

There was no mortality attributable to the operation in his entire material.

JOSEPH K. NARAT, M.D.

MISCELLANEOUS

Cieslak, A. K., and Stout, A. P.: Traumatic and Amputation Neuromas. *Arch. Surg.*, 1946, 53: 646.

The authors analyze the neuromas found in the records of the Presbyterian Hospital, New York. City. Pain, anesthesia, and paralysis were the chief complaints, and they occurred in the order given. The symptoms had existed for a period of from 2 months to 20 years.

The common cause for neuromas was trauma. Accidents, industrial injuries, and amputations preceded most of them. Some followed surgical procedures. The authors believe that much difficulty has occurred because of inadequate examination following injury. They advocate prompt débridement and end-to-end suture of divided nerve ends, with mobilization and transplantation of the nerve if necessary. The neuroma, once formed, should be dissected from the surrounding tissues and excised in slices until normal fasciculi are seen. In the case of amputations, ligation of the nerve is recommended in order to prevent oozing of blood from the nerve end. The nerve end should be allowed to retract into the soft tissues to avoid incorporation in the scar tissue. Nothing need be injected into the nerve.

DANIEL RUGE, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Herrmann, J. B., Adair, F. E., and Woodward, H. Q.: The Effect of Estrogenic Hormone on Advanced Carcinoma of the Female Breast. *Arch. Surg.*, 1947, 54: 1.

The favorable results obtained by a group of English investigators from the use of estrogenic hormones in some cases of advanced carcinoma in the female prompted the authors to try this therapeutic procedure. Seventeen patients were selected. Of these, 13 had primary inoperable cancer for which no previous therapy had been administered; 2 patients had recurrent lesions in the same breast several years after treatment of inoperable carcinoma by irradiation; in 1 patient, a carcinomatous ulcer had developed in the mastectomy scar, and in the remaining patient recurrent nodules had developed in the skin of the thoracic wall. A biopsy specimen, positive for cancer, was obtained in every case.

These 17 patients were treated exclusively with a synthetic estrogenic hormone (ethinyl estradiol), administered orally. One milligram of this substance, in the opinion of some investigators, is the equivalent of from 7 to 20 milligrams of diethylstilbestrol. In the present investigation, the dose of ethinyl estradiol varied from 0.15 to 0.7 milligrams daily. On the basis of the lower figure given previously this dosage would be equivalent to at least 1.0 to 5.0 milligrams of diethylstilbestrol daily.

The duration of the treatment with estrogenic hormones varies from 2 to 11 months.

To date, the cases of only one group of patients with advanced carcinoma of the breast, treated by estrogens, have been reported, namely, those of the 10 English investigators who pooled their cases (a total of 100) and presented them in a symposium. The authors' findings do not differ essentially from those of the English investigators. An important point of agreement is that the favorable results have been predominant in women above the age of 60.

The results of the present investigation suggest a decidedly deleterious effect of estrogens on women in the younger age group. The effects were most striking in a 40 year old patient who was menstruating regularly. When first seen, her general condition was good despite the mass in the right breast and axilla. Roentgenograms revealed no evidence of disease in the lungs, the lumbar portion of the spine, or the pelvis. Soon after the institution of the estrogen therapy her condition deteriorated. Within a period of 3 months she was bedridden and death occurred about 1 month later. The rapid progress of the disease may have been the result of a specific action of the estrogen, or it may have been the result of vascular changes produced in the breast by the hormone. Illustrations showing the progress of the disease accompany the article.

Both estrogens and androgens apparently exert an inhibitory effect on carcinoma of the female breast. The pituitary gland may be the common denominator. Moore and Price have presented evidence that the pituitary may be influenced by the sex hormones. They found that gonadal hormones of either sex exert a depressing effect on the hypophysis of male rats, resulting in a diminished amount of the sex-stimulating factor available to the organism. Badger and his coworkers concluded from their researches that some synthetic estrogens exert an inhibition of growth on animal neoplasms. In their opinion, the action might be, in part, local on the tumor cells and in part central on the pituitary.

In conclusion, the authors state that a favorable response was noted in 7, or 40 per cent, of the patients—5 with superficial lesions of the soft parts, and 2 with pulmonary metastases; the response occurred predominantly in women over 60 years; the skin of the breasts in elderly women may become pink and the mammae engorged; the dosages employed induced uterine bleeding, sometimes severe, in over 50 per cent of the patients; vaginal smears were studied in 6 patients, all of whom showed a well developed estrus reaction; there is suggestive evidence that in young women estrogenic hormones may accelerate the progress of the disease; there were no changes in serum calcium, protein, or alkaline phosphatase levels that could be ascribed to the administration of daily doses of an estrogen (ethinyl estradiol). A fall in the serum phosphorus level was observed in a large percentage of cases; hyperglycemia was decidedly reduced in 1 patient solely by the use of estrogen. JOHN J. MALONEY, M.D.

TRACHEA, LUNGS, AND PLEURA

Fisher, G. E.: Primary Neoplasms of the Trachea. *South. Surgeon*, 1947, 13: 78.

Abnormal growth of the cells composing the undifferentiated basal layer of pseudostratified epithelium has the potentiality of producing columnar, squamous, or glandular epithelium which may result in various forms of neoplasms. The type of tumors reported, that could be determined histologically, have been listed as fibromas, papillomas, lipomas, chondromas, adenomas, lymphomas, intratracheal goiter, angiomas, cylindromas, sarcomas, carcinomas, and endotheliomas. This great variation in the histologic structure of tracheal neoplasms obviously indicates that there will be a similar variation in the rapidity of growth in individual tumors.

The cardinal signs and symptoms are cough, dyspnea, and hemoptysis. As the growth increases in size, cyanosis may develop because of increasing obstruction of the tracheal lumen. Apnea and suffocation will eventually develop if the growth cannot be controlled.

The author reports 1 case of a female, aged 60, whose chief complaint was "asthma" from which she had suffered 8 years. She had hemoptysis and blood streaked sputum. The patient was bronchoscoped. Just above the bifurcation of the trachea a large growth was encountered which arose from the left posterolateral wall of the trachea and filled approximately 80 per cent of the tracheal lumen. It extended downward, obstructing the left main bronchial orifice. A biopsy diagnosis of carcinoid was made on morphological similarities.

The patient was bronchoscoped with an 8 mm. instrument, and the tumor was partially removed with biting forceps and as thoroughly cauterized with electrocoagulation as deemed advisable at the time. Postoperatively there was considerable improvement and a definite partial re-expansion of the left lung.

Diagnosis is most easily made upon bronchoscopic examination of the growth, biopsy, and microscopic examination of the tissue removed. The most satisfactory means of treatment is fulguration of the growth by means of electrocoagulation through the bronchoscope, accompanied by deep roentgen ray therapy. LEE PULLEN, M.D.

Overholt, R. H., Langer, L., Szypulski, J. T., and Wilson, N. J.: Pulmonary Resection in the Treatment of Tuberculosis. *J. Thorac. Surg.*, 1946, 15: 384.

The present day operative procedure of pulmonary resection, the risk as to postoperative complications, and the mortality are discussed. The status of a consecutive series of 192 patients, on whom 200 resections were performed, is reported.

The use of the lateral position for pulmonary resection has 2 disadvantages: (1) the diseased side is directly over the sound side, favoring gravity drainage of secretions from the bad to the good lung, and (2) excursions of the thoracic cage and diaphragm on the sound side are impaired by the weight of the body. In an attempt to reverse the relative positions of the two lungs during operation, the patient is suspended face down and his chest turned so that the sound lung is uppermost. This new position is advantageous from several points of view: (1) operative contralateral spread of the disease has been reduced from 19 to 10 per cent; (2) the possible range of respiratory excursions is greater, and patients adjust themselves better to open pneumothorax; (3) the amplitude of the mediastinal swing, or displacement, is greatly reduced; (4) the use of intrabronchial positive pressure can be eliminated in most cases; (5) exposure of the posterior aspect of the hilum is facilitated; (6) the weight of the lung allows it to fall forward, which eliminates the need for holding it up, or the use of traction during dissection; and (7) cardiac irregularities and standstill have been practically eliminated as complications.

A method of paravertebral block anesthesia and intratracheal intubation after topical application has been developed, with these advantages: (1) a better control of intrabronchial secretions can be obtained; retained secretions in the abnormal lung are not released by bronchial relaxation; aspirations do not disturb the plane of anesthesia, or result in periods of anoxia; the cough reflex is present throughout the operation; (2) the anesthetic agent is less toxic; and (3) the immediate postoperative condition of the patient is better. With the use of paravertebral block and local infiltration with novocain, the incidence of contralateral spread has been reduced from 19 to 10 per cent.

Pulmonary resection is not a competitive, but a supplementary form of treatment to the collapse therapy procedures. The series of patients presented cannot be compared with any thoracoplasty series, since complicated forms of tuberculosis were present, in which collapse therapy had failed, or which were unsuited for thoracoplasty. Upper lobectomy should not be performed as an elective procedure when there is a reasonable chance to control the lesion by thoracoplasty because ipsilateral exacerbation of the remaining foci frequently occurs.

Technical maneuvers considered to be particularly important are: (1) avoidance of lung clamps; (2) avoidance of contamination from the lung or cut bronchus; (3) early preliminary bronchial ligation; (4) pleural flap re-enforcement of the bronchial stump; and (5) routine bronchoscopy after resection to ascertain the condition of the bronchial stump.

A final appraisal of the value of resection in the treatment of tuberculosis cannot as yet be made. Larger series of patients must be studied for longer periods of time. SAMUEL KAHN, M.D.

Decker, H. R.: The Treatment of Thoracic Actinomycosis by Penicillin and Sulfonamide Drugs. *J. Thorac. Surg.*, 1946, 15: 430.

While actinomycosis (streptothricosis and nocardiosis) is the most common of systemic mycoses, it remains a comparatively rare disease. There has been some confusion in the classification of the Actinomyces. In the war 2 types have been recognized as pathogenic to man: (1) the Actinomyces bovis, an anaerobic form which is gram positive and nonacid fast; and (2) the Nocardia asteroides, an aerobic acid fast group, which includes the Actinomyces gypsoides. Nocardia madurae is an aerobic nonacid fast group. Both types produce mycelia, which form tangled masses of filaments recognized as "sulfur granules."

Characteristically, these fungi produce a chronic granulomatous type of inflammation in which suppuration, abscesses, and sinuses develop, and dense scar tissue is produced in excess. The inflammation burrows through tissue with no respect for normal fascial planes and anatomic barriers. The dense fibrous tissue diminishes vascularity and renders the lesions less permeable to the action of drugs. Superimposed on the actinomycotic process, there is often secondary infection due to pyogenic bacteria.

Infection of the lung may be air borne or from fungi aspirated from the mouth, teeth, and tonsils.

Three types of thoracic disease are differentiated, but are really all part of one process: (1) bronchitic, in which the invasion usually starts in the bronchi, but is rarely confined to the bronchial tree; (2) pneumonic, a bronchopneumonitis in which the lung parenchyma is replaced by nodular or diffuse caseating infiltration which breaks down into abscesses (The usual location is in the lower or central parts of the lungs.); and (3) pleuritic, found in cases in which the invasion is most extensive in the pleura, whence the disease spreads to involve the chest wall. Abscesses form anywhere, but commonly near the breast and axilla, where sinuses develop. The ribs are invaded in 25 per cent of the cases and the vertebrae in 10 per cent; the sternum is invaded only occasionally.

Cough is the first symptom; at first it is dry, but later there is mucoid sputum which becomes purulent and blood streaked. Hemorrhage is rare. Intermittent fever, dyspnea, malaise, night sweats, and loss of weight follow. Pain appears when the pleura is involved. Secondary anemia and high leucocytosis are common. Physical signs depend on the character of the pulmonary and pleural involvement. The picture is suggestive of tuberculosis. Early x-ray examination reveals hilar and peribronchial infiltration; then areas of consolidation appear, with abscess formation, thickening of the pleura, or pleural effusion. The picture is not distinctive, but marked pleural thickening, erosion of the ribs, contracture of the chest wall, and narrowing of the pulmonary fields are suggestive.

The early diagnosis of thoracic actinomycosis is difficult to make. It is established definitely by finding characteristic mycelia or sulfur granules in pus or fixed tissue sections. The differential diagnosis must be made from tuberculosis, pyogenic abscess, bronchiectasis, and empyema due to pyogenic bacteria.

In the treatment, surgery is essential. Abscesses should be drained, sinuses of the chest wall excised, diseased rib removed, and involved portions of the lung ablated. Sulfonamides may exercise a favorable influence on the disease because of their effect on the secondary pyogenic infection. The early favorable response to sulfonamides is very often not maintained.

Penicillin is the best therapeutic agent for actinomycosis of the chest as well as for actinomycosis elsewhere in the body. If administered early, it causes arrest of the disease and recovery in any age group. In most cases penicillin produces a favorable outcome, even in long standing cases, especially if it is used with sulfonamides, to clear the secondary pyogenic infection.

Large doses of penicillin, from 100,000 to 200,000 units a day for about 2 weeks, should be given. Since some strains of actinomyces are fairly insusceptible, a plate test or broth culture reaction may be the proper guide for dosage. After several weeks, another course of penicillin treatment should be given. Since the fungus may remain latent for long periods, repeated courses of penicillin treatment should be given for a year and at any time when symptoms reappear. Intramuscular administration is preferable, but this may be combined with intrapleural or intrapulmonary injection.

SAMUEL KAHN, M.D.

Gladnikoff, H.: Genesis of Bronchiectasis, an Unappreciated Bronchodilating Force. *Acta med. scand.*, 1946, 126: 411.

There are two types of bronchiectasis, congenital and acquired. Congenital bronchiectasis is a rare condition, two forms of which have been described: (a) fetal bronchiectasis, and (b) atelectatic bronchiectasis, in which the bronchi shortly after birth become gradually widened as a result of the developmental effect of collapse of the pulmonary parenchyma. It is, however, extremely difficult to differentiate between the strictly congenital and the postnatal disease. Acquired bronchiectasis may be metapneumonic atelectatic, or idiopathic. The author discusses the literature on bronchiectasis, going back as far as Laennec's original description, in 1819, as well as the causes and treatment of the condition.

It is believed that pressure of secretion behind a bronchial stenosis and destructive injury to the bronchial wall are possible causes for the genesis of occasional cases of bronchiectasis.

The inspiratory movements of the thoracic wall and the diaphragm are a bronchodilating force of considerable magnitude when their impulses are transmitted to air-conveying bronchi through nonair-conveying lung tissue. The author believes it is possible that this force exceeds the tolerance of the bronchial walls under certain conditions. Clinical, roentgenological, and morbid anatomical observations in pneumonia and atelectasis, as well as during the genesis of bronchiectasis, have shown this bronchodilating force to be the usual and possibly the only cause for the genesis of bronchiectasis.

Diagnosis while the bronchial dilatation is reversible is essential for conservative treatment. For this reason bronchography should be carried out in all cases of pneumonia and atelectasis which cannot be checked quickly, or in cases of relapse, particularly in children.

Apart from combating infection, the treatment of reversible bronchial dilatation should be directed towards the elimination of abnormal, bronchodilating forces. With this object in view, the cause of the genesis of the bronchial dilatation justifies steps for the rapid re-aeration of the consolidated lung tissue; if this proves impossible, artificial pneumothorax should be accomplished, but the lung should not be collapsed. If pneumothorax is impossible, it may be necessary to perform a unilateral phrenicotomy.

PAUL MERRELL, M.D.

Kay, E. B., Meade, R. H., Jr., and Hughes, F. A., Jr.: The Surgical Treatment of Bronchiectasis. *Ann. Int. M.*, 1947, 26: 1.

The clinical course of bronchiectasis is characterized by chronic sepsis, varying degrees of debility,

and, usually, recurring attacks of pneumonia. There may be remissions with relative freedom from symptoms. The degree of disability is largely dependent on the degree of sepsis, which is dependent on the adequacy of bronchial drainage.

The destructive changes in bronchiectasis are permanent. In the development of the disease, the ciliated columnar epithelium is frequently ulcerated and replaced by nonciliated cuboidal or squamous epithelium, and the normal elastic tissue and smooth muscle fibers are partially or completely replaced by granulation or scar tissue. Because of the loss of the normal cleansing action of the bronchial tree, due to the loss of the ciliary action of the mucous membrane and the peristaltic action of the bronchial wall, stasis of the exudate and resulting infection occur.

The prognosis of patients with untreated or medically treated bronchiectasis is poor. The mortality rate is said to be higher when the bronchiectasis is cystic (55%) or saccular (37%), than when cylindrical (13%). The morbidity is also considerable. Conservative therapy to improve bronchial drainage, combat infection, and improve the general condition of the patient is of value. Postural and bronchoscopic drainage, breathing and coughing exercises, eradication of other foci of infection, a high caloric diet, vitamin therapy, and medication to thin the viscid bronchial exudate are all valuable adjuncts in the treatment of bronchiectasis. Penicillin is of value in the treatment of the recurrent pneumonic episodes, and also decreases the sepsis and intoxication during the interval stages. But symptomatic treatment is only temporizing with the disease. Death from bronchiectasis usually results from pneumonia, septicemia, pericarditis, failure of the right side of the heart, hemorrhage, or empyema. These hazards are present as long as the disease exists.

Permanent cure can be obtained only by pulmonary resection. The operative mortality and morbidity are very small at the present time. Only 1 death occurred among 220 consecutive lobectomies. One hundred and eighty-four lobectomies were done for bronchiectasis, 20 for pulmonary cysts, 11 for chronic pulmonary suppuration, 3 for bronchial adenomas, and 2 for basilar tuberculosis. The bronchiectasis in patients not operated on was either too minimal or too extensive.

The decision as to the advisability of operation depends on the amount of disability, the extent of the destructive changes, and the evidence of chronic intoxication. Patients who present no significant clinical evidence of the disease and those with minimal bronchiectasis can be cared for conservatively. Those in whom all 5 lobes are involved are beyond surgical treatment. In the other cases, lobectomy is recommended if there are no contraindications to operation. The field of operability now includes patients with extensive bronchiectasis on one side and minimal disease on the other, or with extensive bilateral bronchiectasis, as long as the right upper lobe and upper aspect of the left upper lobe are normal and the cardiorespiratory reserve is adequate.

Adequate bronchograms should be made to ascertain the degree and distribution of the bronchiectasis present. Careful bronchoscopy should be done to determine from which lobes most of the exudate is escaping and the presence of unduly active inflammation of the bronchial mucosa, to improve drainage, and to eliminate the possibility of the presence of foreign bodies or tumors. Bronchospirometric studies, to determine which is the worse side in bilateral cases, the pulmonary reserve of the uninvolved lung in dyspneic patients, and the extent of functional tissue in borderline cases, have been found to be of value.

The operation should be postponed until the patient is in as good condition as possible. From 4 to 6 weeks should elapse after bronchography, to allow elimination of the iodized oil. During this time, the patient is placed on a high caloric, high vitamin diet. Postural drainage should be used. A course of penicillin given through the trachea is of value in patients with copious sputum. Penicillin is given intramuscularly on the evening before operation.

All the operations have been done by the individual ligation technique. The posterolateral approach with resection of the seventh rib, or the lateral approach with resection of the sixth rib gives good exposure. Elevation of the head of the operating table in combination with early operative occlusion of the bronchus keeps the exudate in the bronchiectatic abscesses and does not allow it to drain into the main bronchi and cause obstruction and, perhaps, be aspirated into the opposite lung. Secure closure of the bronchial stump largely determines the postoperative course. The bronchus should be amputated high, to prevent puddling of secretions at the site of amputation later. Silk technique is used throughout. All pleuritic adhesions between the upper lobe and chest wall are severed, since they prevent the upper lobe from readjusting itself to the larger space allotted to it. Blood transfusions are begun at the outset of the operation and continued throughout its course. Usually, from 1,000 to 1,500 c. c. of blood suffice.

Postoperatively, adequate oxygenation is provided by tent or intranasal oxygen for about 24 hours. Frequent intratracheal aspiration, insistence on coughing, deep breathing exercises, and frequent change in position help to maintain an open tracheobronchial airway, which is essential to early reexpansion of the remaining lobe and obliteration of the pleural space. Penicillin is given intramuscularly for 7 days. The patient is routinely gotten up by the third postoperative day.

In only 1 patient did significant shock from blood loss develop. Bronchopleural fistulas with resulting empyemas occurred in 20 cases. Atelectasis occurred in 5 cases because of intrabronchial exudate and occlusion.

Postoperative bronchospirometric studies on 26 patients demonstrated that the function of the remaining pulmonary tissue on the operated side is

influenced greatly by the postoperative pleural complications. In no instance was the pulmonary function significantly impaired following an uneventful lobectomy. Apparently, the bronchiectatic lobe contributes very little to the oxygenation of blood circulating in its pulmonary tissue as the blood returns to the heart unoxygenated and with a high carbon dioxide content. This is largely responsible for the cyanosis and dyspnea seen in these patients. On removal of the bronchiectatic tissue the blood can then be circulated only through alveoli that allow proper oxygenation and diffusion of gases.

SAMUEL KAHN, M.D.

Mattei, C., Tristani, M., and Barbe, A.: Roentgenographic Aspect of the Zonal Catheterization of the Lung during the Endobronchial Instillations of Penicillin in the Treatment of Pulmonary Abscesses (Aspect radiologique des cathétérismes zonaires du poumon au cours de la pénicillothérapie endobronchique des abcès pulmonaires). *Presse méd.*, 1946, 54: 638.

The zones of aeration in the pulmonary parenchyma with bronchial and vascular autonomy as described by Lucien, Grandgerard, Weber and Beau, De Pierret, Coulouma, Breton and Devos, have been found to be accurate and of great practical value by the authors for localizing pulmonary lesions and catheterizing the bronchi.

A brief anatomical review of the topography of these zones of aeration is given, and the schema of Lucien and Beau is reproduced (Fig. 1).

The authors have performed 1,100 bronchial catheterizations without the use of the bronchoscope, under local anesthesia, using pontocaine. A 1 per cent solution was used in the pharynx and larynx, and a 0.5 per cent solution in the trachea and bronchi. Treatment was given for 63 pulmonary abscesses and various bronchial suppurative processes. They advocate the use of a curved rubber sound, with an extremely opaque tip. The 63 abscesses were localized in the following zones: 40 per cent in the upper dorsal, 13 per cent in the apical, 15 per cent in the anterior zone of the middle lobe, 13 per cent in the upper area of the lower lobe, and 19 per cent in the remaining zones.

All those catheterizations were made in order to deposit the penicillin as close as possible to the abscess which had been accurately localized. The authors are convinced that the solution of penicillin as well as the lipiodol often reaches the foci of suppuration, as illustrated by roentgenographic study.

The authors reported on 50 cases of pulmonary abscess with a complete study and follow-up; 49 of the abscesses had been active for more than 2 months. It is believed that 20 (40%) clinical and roentgenographic cures were maintained from 6 to 12 months; in 16 (32%) of the cases clinical improvement was obtained but there was persistence of a few roentgenographic findings; in 5 cases (10%) there was improvement characterized by disappearance of the foul odor and almost complete suppression of expectoration, and marked improvement of the general condition of the patient but persistence of the roentgenographic findings. Finally, the authors state that there were 9 (18%) failures, of which 6 occurred in cases presenting neoplasms. In these cases only the amount of suppuration was diminished. Three cases presented true abscesses and made absolutely no response to treatment. Two of the abscesses were in polycystic cavities and 1 abscess was an atypical one with no collapsible cavity.

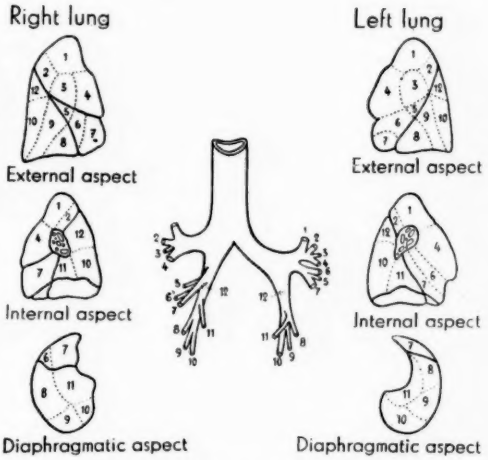

Fig. 1. (Mattei *et al.*) Upper lobe: 1, apical area; 2, dorsal; 3, external; 4, ventral. Middle or lingual lobe in the left lung; 5, external; 6, posteroexternal; 7, anterointernal. Lower lobe: 8, ventrodorsal; 9, laterobasal; 10, dorsobasal; 11, infracardiac; 12, mid-dorsal. The numeration of the bronchi correspond to those of the zones which they ventilate. (Thirteen other patients under treatment had similar localizations.)

These results, which seem to stand the test of time so far, prove the value of this simple method of endobronchial instillation of penicillin in the treatment of pulmonary abscesses.

GERARD GAGNON, M.D.

Soubrié, A., Morera, J., and Labourt, F. E.: The Incidence of Pleuropulmonary Perforation following Intrapleural Pneumonolysis, as Determined by Analyses of the Intrapleural Gases (Frecuencia de la perforación pleuro-pulmonar en la neumonolisis intrapleural. Estudio de los gases pleurales). *An. Catéd. pat. clin. tuberc.*, 1945, 7: 330.

The composition of pneumothorax gases was determined before and after intrapleural pneumonolysis in 50 patients. Based on these findings, evidence of bronchopleural communication was found in 5 cases after the division of substantial adhesions, and in 1 case it was recorded after the sectioning of filmy adhesions only. The authors thus consider the incidence of such fistulas as a result of the operation to be 10 per cent.

In 2 cases evidence of a fistula was encountered before operation.

The results of the analyses in these 50 cases are given. HIRAM T. LANGSTON, M.D.

Kantorek, R.: Superior Pulmonary Sulcus Tumors (Nádory plicních hrotů). *Lék. listy*, 1046, 1: 354.

Malignant tumors of the pulmonary apices demand for their recognition not only a close roentgenographic study, including tomography and perhaps kymography, but also close clinical observation of the characteristics and development of the morbid process. The most typical malignant growth in this region is that denominated by Pancoast, the superior pulmonary sulcus tumor. This particular growth is characterized, as a rule, by a very striking combination of symptoms, including a peculiar form of neuralgic involvement of the brachial plexus, with pains in the arm and shoulder, insensitivity of the elbow region, and sensations of burning and formication in the regions of the hand and fingers of the involved side. When this tumor is present the sympathicus is also very frequently involved, which results in a Horner's syndrome. The third characteristic of Pancoast's tumor is the roentgenological evidence of the eroding effects on the ribs, particularly the posterior section of the third rib. The roentgen findings, of course, are similar for all the tumors in this region. However, the sarcoma is more sensitive to irradiation therapy, and the endothelioma, arising from the pleura, grows more slowly. However, the carcinoma is sufficiently sensitive to be reduced in size by roentgen therapy, which does not, however, hinder its strong tendencies toward metastasis.

Differential diagnosis is a difficult problem in tumors of this region. Of chief concern, of course, is the evidence of healed tuberculosis with its cicatricial retraction and infiltration. However, a tumor should be easily distinguishable not only through its constant growth in size, but also through its deeper, more homogenous and smooth bordered shadow. Metastases in this region are usually recognizable as such not only through their usual multiplicity but also by evidence of the parent tumor elsewhere. Atelectasis is an important thing to look for in the surrounding lung tissues since it is frequently absent in the presence of shadows of other origin than tumor (lymphogranulomatosis, actinomycosis, Hodgkin's disease).

Nevertheless, the diagnosis of the condition present in this region will often prove to be a tremendous problem, and in the final paragraph the author suggests that the diagnosing physician depends on a certain amount of intuitive feeling but always, of course, tries to make the diagnosis on an objective basis.

JOHN W. BRENNAN, M.D.

HEART AND PERICARDIUM

Maire, E. D.: Coarctation of the Aorta. *N. England J. M.*, 1947, 236: 1.

Advances made by surgeons in handling the great blood vessels have stimulated new interest in coarctation of the aorta. The author's case presentation includes a discussion which re-emphasizes much of what Sir Thomas Lewis wrote about this subject.

Coarctation of the aorta is generally classified into two anatomic groups, both of which are located, for the most part, in the distal portions of the arch: (1) the first form, known as the infantile type, is characterized by a generalized narrowing of the arch in its distal portion, extending from the origin of the left subclavian artery to the region of the ductus arteriosus (Clinically, this is a rare form and is so frequently accompanied by other major cardiac anomalies that death occurs in infancy.); and (2) the adult type is characterized by an abrupt narrowing, sometimes to the point of obliteration, of the aorta in the proximity of the insertion of the ligamentum arteriosum (This is not a rarity, various observers having reported an incidence of 1 in 1,550 cases at autopsy.). The more favorable life expectancy in the second group results from an adequately compensating collateral circulation, as well as from the fact that the associated developmental anomalies, if any, are less serious than those found in the infantile type. In the main, these anomalies fall into two groups: (1) those of the heart and great vessels, including bicuspid aortic valves, anomalous origin of the arteries of the aortic arch, persistent left superior vena cava, aortic septal defects, and subaortic stenosis, and (2) anomalies of the body at large, such as hypospadias, absence of a kidney, vertical position of the stomach, horseshoe kidney, diaphragmatic hernia, subluxation of the joint, slight mongolism, ichthyosis, pigeon breast, and congenital cerebral vessel aneurysm.

Embryologists give the following explanations of the development of coarctation of the aorta of the adult type:

1. (Brunner) The tissue of the ductus arteriosus, at its junction with the aorta, which shortly after birth becomes completely stenosed, anomalously incorporates the contiguous portion of the aorta in this obliterating action. The primitive fourth arch (aorta) falls prey to the obliterating action of the primitive sixth arch (ductus).

2. Others point out that the ligamentum arteriosum exerts a ropelike tugging on the aorta at the junction of the two, which causes a kinking of the aorta that results in stenosis.

3. (Reynaud and Rokitansky) Embryonic maldevelopment of the descending limbs of the primitive left aorta causes the coarctation in those cases in which stenosis occurs proximal to the origin of the left subclavian artery or in the abdominal aorta.

The important symptoms of the adult type, beginning after years of apparent good health, consist mainly of breathlessness and palpitation after exertion, fatigability, slight cough, sometimes giddiness with hot flushing of the face, headaches, and thoracic pain. (The author's patient was referred by a neuropsychiatrist to whom he had been sent because of nervousness.) The physical signs include:

1. Foremost, the reversed relation of the brachial and popliteal arterial blood pressures.

2. The femoral pulsation is weaker, with a definite lag in its summation, compared to that of the radial pulse; the lag is 0.145 of a second according to accurate measurement by Sir Thomas Lewis.

3. Visual, palpable, or auditory evidence of increased pulsations of various arterial branches of the aorta.

4. Sulcation along the inferior margin of the posterior portions of the ribs.

5. Absence of the aortic knob and extension toward the neck of the silhouette of the supracardiac vessels.

The author makes the well taken point that too often in cases of hypertension no effort is made to determine the blood pressure in the lower extremities, so that, without any doubt, cases of coarctation of the aorta are frequently missed.

EUGENE J. AUDI, M.D.

ESOPHAGUS AND MEDIASTINUM

Uhde, G. I.: Chemical Burns of the Esophagus. *Ann. Otol. Rhinol.*, 1946, 55: 795.

The clinical records of all patients treated for chemical burns of the esophagus at the University of Oregon Medical School Hospitals during a 15 year period were reviewed. An analysis of these findings is presented.

In the present series, there were no deaths as a result of peroral instrumentation. The esophageal findings at autopsy, in one case of burns due to a silver salt, lactic acid, and lye are given. The patient in this case died of brain abscesses of both temporal lobes, which is interesting in view of the fact that deaths from brain abscesses under similar conditions have been reported by other authors. The course of action taken at this hospital in the treatment of acute esophageal burns, together with arguments pro and con, is discussed.

The following procedure is carried out in all cases of esophageal burns: (1) immediate neutralization of the poison; (2) immediate swallowing of a size D twisted (not braided) silk thread on completion of procedure 1; (3) treatment to avoid dehydration and starvation; (4) consultation with an otolarynogologist within 24 hours; (5) examination with barium under fluoroscopy and with flat plates as soon as the initial fever subsides, usually in 7 to 10 days; (6) esophagoscopy, after determination of the site and degree of obstruction by procedure 5; (7) following the esophagoscopy, bouginage up to 45 French in an adult with mercury bougies of the Salzer or Bokay types, carried out once or twice weekly, or less often, depending upon the stricture's reaction to bouginage and the patient's ability to swallow. Bouginage is performed over a period of 6 months to 2 years, depending upon the results; (8) if frequent bouginage is unsuccessful, that is, if the child is in danger of becoming malnourished with a retardation in normal development, a gastrostomy is performed, the esophagus is placed at rest, and the stricture is dilated in the retrograde manner advocated by Tucker.

JOHN J. MALONEY, M.D.

Ladd, W. E., and Swenson, O.: Esophageal Atresia and Tracheoesophageal Fistula. *Ann. Surg.*, 1947, 125: 23.

Esophageal atresia and tracheoesophageal fistula received comparatively little recognition and aroused little interest among clinicians until the last decade. The anomaly is quite common, occurring about as frequently as harelip and cleft palate.

There is a wide variation in the pathologic findings. No 2 cases are exactly alike. Ladd describes 5 types. In Type 1, the upper portion of the esophagus ends in a blind pouch in the region of the body of the first or second dorsal vertebra, and the lower segment of the esophagus begins again in a blind pouch at the level of the fourth or fifth dorsal vertebra. In Type II, the upper segment of the esophagus ends in a fistulous tract entering the trachea just above its bifurcation, whereas the lower segment is much the same as in Type I. In Type III, the upper segment ends blindly as in Type I, whereas the lower segment is connected to the trachea by a fistulous tract just above the bifurcation. This type and Type IV are by far the most common in the reports of the literature as well as in the authors' experience. Type IV is similar to Type III except that the fistulous tract of the lower segment enters the trachea at its carina instead of just above its bifurcation. In Type V, both the upper and lower segments communicate with the trachea.

If a newborn infant becomes cyanotic and shows an excess of saliva or frothy mucus in the mouth, the diagnosis of esophageal atresia should be considered. If, subsequently, the infant vomits all fluid offered almost immediately after it is given the diagnosis should be strongly suspected and steps taken to confirm or disprove the suspicion. First, a No. 8-F. or 10-F. soft rubber catheter should be introduced into the esophagus, preferably under the fluoroscope, and if this meets an obstruction 10 or 12 cm. from the lips, the diagnosis is confirmed. The diagnosis should now differentiate between the types of the malformation, which is done with the help of the roentgen rays.

The preoperative preparation of these patients is important. They should be placed in an oxygen tent for the administration of oxygen in high concentration. Then a small soft rubber catheter is introduced into the pharynx and attached to constant suction. By this means and by keeping the infant in a slight Trendelenburg position, the air passage can be kept fairly clear and respiration made much easier. Transfusion and parenteral fluids should be given as indicated.

All attempts to remedy esophageal atresia with tracheoesophageal fistula without direct ligation of the fistula have failed. The retropleural operation through the right side of the back has given the best results, and cyclopropane has been the anesthetic of choice.

After dissection down to the segments of the esophagus, judgment and experience are of value in

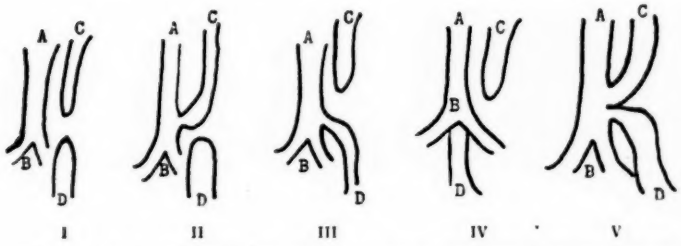

Fig. 1. (Ladd, Swenson) Diagram showing the arrangement of the trachea and esophagus in 5 types of esophageal atresia and tracheoesophageal fistula. The letters refer to the following structures: A, trachea; B, bifurcation of trachea; C, upper segment of esophagus; and D, lower segment of esophagus. (New England Journal of Medicine.)

determining whether a primary anastomosis should be attempted, or the simpler operation of tying and cutting the tracheoesophageal fistula should be done. The decision depends on the condition of the patient and the distance between the two ends of the esophagus. If the space between the two segments is much over 2 cm., the chance of performing an anastomosis without tension is not good.

When the conditions indicate, an end-to-end anastomosis is done, the upper blind end being freed well up above the first rib, so that it can be brought to the lower end without tension. The lower segment is isolated and cut away from the trachea almost in the tracheal wall, in order to give it maximum length. As the esophagus is separated from the trachea, the opening into the trachea is closed by a running suture of fine silk, and this row of sutures is, in turn, covered by a second layer of running sutures of the same material. The final step is the suturing together of the two ends.

In patients in whom the ends are too widely separated to warrant a primary anastomosis, a multiple stage procedure is adopted. At the first operation the site of the atresia is approached as described for primary anastomosis. The lower segment of the esophagus is cut away from the trachea at the site of the fistula, both ends are tied, and an over-and-over stitch is placed to insure against leakage. This having been done, the chest wall is closed.

During the next few days the patient is kept in slight Trendelenberg position and constant suction is applied to the upper segment of the esophagus to prevent aspiration of saliva and mucus. In this interim the baby's fluid balance is maintained by the intravenous administration of blood or plasma, and saline or glucose solution. At the end of 2 or 3 days, under local or cyclopropane anesthesia, a gastrostomy is performed through a high left rectus incision. This enables the infant to be fed and obviates the necessity of continuing parenteral fluids.

The third stage of the operation is performed 1 or 2 days after the gastrostomy, and consists of bringing the upper segment of the esophagus out in the neck.

After these procedures have been completed, an indefinite period elapses before an anterior thoracic esophagus is constructed. The stomach and esophagus can be connected by an epithelial lined tube made over the left chest wall and covered by a tubed graft taken from the right axilla. In other cases a segment of jejunum is attached to the lower end of the skin tube. An appropriate loop is freed, the jejunum divided and the proximal end closed. A side to side anastomosis is made between the closed jejunum and a loop farther distalward. The skin of the chest is tunneled under from the cephalic end of the incision through which the jejunal loop is secured to a point under the opening of the skin tube. The proximal end of the jejunal loop is drawn through this subcutaneous tunnel and sutured to the lower end of the skin tube. Provided there is no evidence of inflammation at the site of the dermo-jejunal anastomosis, the patient is given water by mouth on about the tenth postoperative day. These patients can swallow liquids and solids easily and only occasionally is it necessary to promote the emptying of the skin tube by manual pressure.

The authors appreciate that the mortality from esophageal atresia should be further reduced, but there undoubtedly will continue to be an appreciable mortality because of associated anomalies incompatible with life. Among the 76 cases reported in the article, there were 45 deaths, a mortality of 60 per cent. STEPHEN A. ZIEMAN, M.D.

MISCELLANEOUS

Drash, E. C.: Intrathoracic Metallic Foreign Bodies. A Review of the Literature. *South. Surgeon*, 1947, 13: 1.

During World War II, 2 out of 10 wounds were due to bullets and 8 were due to high explosive shells. About 10 per cent or less of retained foreign bodies are bullets; the remainder are high explosive shell fragments. The mortality and morbidity of shell fragment wounds is higher because of their greater frequency, the irregular fragments do more damage, and the wounds show a greater percentage of infections

because the shell fragments tend to carry extraneous material into the tissue.

In field and evacuation hospitals in Italy, the treatment of chest injuries was primarily directed at the conservation of life by restoring normal cardiorespiratory physiology, treating shock by blood replacement, and preventing infection.

In general, the majority of patients with thoracic wounds, seen in forward hospitals, recovered on a system of blood replacement, débridement and closure of chest wall wounds, aspiration of blood and air from the pleural space, insertion of an intercostal catheter for tension pneumothorax, and novocain intercostal block for fractured ribs.

Operations other than simple débridement were done in forward hospitals only when there was evidence of gross continued bleeding, uncontrolled bronchopleural fistulas, or evidence of transdiaphragmatic or esophageal injury.

In the Mediterranean Theater, foreign bodies of over 1.5 cm. in greatest diameter in the pleura or lung, were to be removed in the thoracic surgical center in the base hospital. Operations were indicated for prevention of infection or removal of clotted blood from the pleural space. Failure of the lung to re-expand progressively and quickly within 4 weeks of adequate drainage was accepted as an indication for thoracotomy and decortication.

Foreign bodies causing symptoms should be removed as soon as expedient. Asymptomatic foreign bodies, over 1.5 cm., were removed in from 4 days up to 3 weeks of injury. When present as long as from 3 to 4 weeks, fibrosis about the foreign bodies made thoracotomy more difficult.

The validity of removing asymptomatic shell fragments as a prophylactic procedure can only be decided years later when operative morbidity rates are compared with the percentage of complications which develop in patients with retained shell fragments. Harkins reported that only 8 per cent of patients with chest wounds had foreign bodies which required removal. They were removed to prevent hemorrhage and suppuration. Other factors considered were size and irregularity, proximity to major vessels and bronchi, dependent position in the parenchyma, and the surrounding reaction as determined clinically and by means of x-ray.

D'Abreu reports a series of 260 cases of penetrating wounds of the thorax with 84 retained foreign bodies, 16 lung abscesses, 77 empyemas, and 15 deaths.

Parker and Burford reported 75 serious complications among 291 cases of intrathoracic foreign bodies. These were empyema, late or recurrent bronchopleural fistula, lung abscess, delayed or recurrent hemoptysis, secondary intrapleural hemorrhage from the lung, and mediastinal abscess. Ten per cent of their cases operated upon had complications.

Tudor Edwards condemns the removal of intrathoracic foreign bodies in forward hospitals since wounds heal well in the presence of uninfected foreign bodies. He points out complications may occur as late as 20 years after wounding. He removes large foreign bodies when sepsis is not present in the fifth to sixth week. He thinks all irregular foreign bodies should be removed from the lung in order to prevent secondary lung changes.

Paine, in a North African general hospital, reported 66 patients with retained thoracic foreign bodies, none of which were operated upon. None had complications and none had symptoms referable to the foreign bodies. Twenty-five of his patients returned to duty.

Blades at Walter Reed thinks each case should be individualized and considers whether foreign bodies produce signs or symptoms, size and position of the fragment, and the psychosomatic effect on the patient. He reports 30 cases of which 16 had removal with no deaths.

Garland in reporting his experience in a naval hospital had 150 cases of intrathoracic foreign bodies, only 20 of which were causing symptoms. Removal was undertaken in 10 cases without a death.

The experience of thoracic surgeons in the chest centers of the United States is different than that of the overseas surgeons. Without the urgent need to return men to duty, their attitude and approach is more conservative than that of the chest surgeon stationed in the forward zones.

Foreign body localizers were not very satisfactory and were little used. A bronchogram is often of value in designating the segment of the lung involved.

There is apparent uniform agreement that foreign bodies in and about the heart and pericardium should be removed if operation is feasible. This generally applies to mediastinal foreign bodies also because of the danger of erosion of important structures. Intrapulmonary foreign bodies, if small and multiple, should not be removed according to the evidence presented. The lung tolerates rather well sterile metallic foreign bodies, but not those associated with infection nor those consisting of cement, bone, clothing, or other organic material.

The late symptoms of foreign bodies consist of (1) migration symptoms, (2) erosion of vessels or bronchi, (3) recurrent infection, (4) pleural irritation, (5) nerve pressure, and (6) changes in adjacent structures due to the injury or presence of the foreign body.

Silent foreign bodies less than 2 cm. in diameter probably should not be removed. Larger foreign bodies should be removed to prevent late complications. Veterans who present themselves for consideration of removal of intrathoracic foreign bodies should be carefully studied to see if the symptoms are actually due to the foreign body or are psychosomatic in nature. The removal of foreign bodies in a small number of cases may be justified on the latter basis after psychiatric consultation.

ROBERT R. BIGELOW, M.D.

Colombo, C.: Contusions of the Thorax (Contusioni del torace). *Minerva med.*, Tor., 1946, 37: 378.

The author reviews the types of thoracic injuries caused by contusion and makes brief suggestions concerning therapy. Under lesions of the thoracic cage are included superficial contusions of the chest

wall, contusions of the breast (particularly during lactation) steatonecrosis, fractures of the ribs, clavicle, and sternum, and luxation of the clavicle. Attention is directed to the syndrome of thoracic shock resulting from trauma of more or less violence but of brief duration, and believed to be due to a disturbance of the autonomic system which results in splanchnic vasodilatation. In contradistinction is the syndrome of thoracic compression or traumatic asphyxia due to long continued reduction of the chest capacity which probably exerts pressure on the superior vena cava.

Under intrathoracic syndromes resulting from contusion injuries are listed lacerations of the parietal pleura, subcutaneous emphysema, pneumothorax, mediastinal emphysema, hemothorax, and empyema. Space is devoted to the diagnosis and treatment of pneumothorax under pressure and the strain of the right side of the heart which may occur in that condition. Brief mention is made of lesions involving the pericardium, the heart, and the great vessels in the mediastinum, and, in conclusion, of lacerations of the thoracic duct, esophagus, and thymus.

EDITH B. FARNSWORTH, M.D.

Candolin, Y.: On Diaphragmatic Hernia. *Acta chir. scand.*, 1947, 95: 61.

Diaphragmatic hernia may not be a very common affection, but the author believes that it is by no means as rare as it is often held to be, because of the fact that an erroneous diagnosis is frequently made. This tendency is facilitated on the one hand by the fact that the hernia is situated deep in the center of the body, resulting in indefinite and abstruse symptoms, and on the other hand by the fact that the etiology varies. With the development of diagnostic facilities there follows a rise in the number of cases met with; thus 30 cases were diagnosed as diaphragmatic hernia at the Mayo Clinic during the 25 year period from 1900 to 1925, and 197 cases have been observed during the ten year period from 1925 to 1935. Diaphragmatic hernias may be grouped into several different classes according to their origin; namely, traumatic, congenital, and so called acquired hernias. They are classified further as genuine with a hernial sac, and as false without it.

The author stresses the fact that the only means of curing diaphragmatic hernia is by operation. He reviews 8 personal cases and points out the most common locations of hernia through the diaphragm. He summarizes his cases as follows:

Eight cases of diaphragmatic hernia have been observed at the Central Hospital of Abo, since 1934. In 4 of these the hernia was the result of a perforating trauma, and in 1 case the result of blunt trauma; in 2 cases the condition was congenital and in 1 case the patient had a hiatus hernia. In 4 cases the hernia was incarcerated and in 1 of these the incarceration arose in connection with a six months' pregnancy; the hernial sac had filled the whole of the left part of the thorax and contained half the ventricle, the whole of the small intestine and the major portion of the large intestine, as well as the pancreas.

The author used the abdominal approach in operating on 5 of the patients, 2 of whom died; the thoracic route was used in 1 case; this patient died; 2 patients were not operated upon, and 1 of these died from incarceration. All survivals are classed as bullet or splinter cases. The author is of the opinion, from a technical point of view, that a laparotomy can be less difficult than one might imagine. The diagnosis of diaphragmatic hernia is not an easy task and confirmation by x-ray examination with contrast media is imperative. When the diagnosis has been ascertained, and the health permits, operation should be performed preferably during an interval devoid of symptoms. PAUL MERRELL, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Glenn, F.: The Surgical Treatment of 1,545 Hernias. *Ann. Surg.*, 1947, 125: 72.

Fifteen hundred and forty-five hernias treated surgically over a five year period (1940–1944) are reported.

The majority of the postoperative complications are systemic and are of vascular or pulmonary origin. Local complications for the most part are due to infection.

Fifty per cent of the deaths, and many of the complications, occurred in patients who presented themselves for operation with "acute" hernia. This term has been employed to designate those patients who require immediate operation because of incarceration or strangulation of the bowel. An incarcerated hernia may not necessarily be an emergency, but immediate operation to exclude the possibility of strangulation is often indicated because the transition from incarceration to strangulation and intestinal obstruction occurs too frequently to be disregarded.

Recent literature reveals that at the present time silk is employed most frequently in the repair of hernia. Cotton suture material is becoming more popular and the use of steel wire, as advocated by Babcock, is increasing.

As other reports on the experience of early mobilization of patients have appeared, it is evident that the trend to get patients (who have had repair of direct inguinal hernia of the congenital type) out of bed on the day following operation, is justified. However, until longer follow-up studies are available definite conclusions cannot be stated. The mobilization of the structures in the repair of any hernia and their meticulous approximation, without tension, by suture material that produces the least reaction, as insisted upon by Halsted in 1893, remains the important principle in this field of surgery.

JOHN J. MALONEY, M.D.

Bhajekar, M. V.: Strangulated Inguinal Hernia: Observations in 50 Cases. *Arch. Surg.*, 1947, 54: 41.

The author attempts to describe the morbid anatomic evolution of a strangulated hernia based on his experience with 50 cases seen in Bombay, India.

The anatomic changes that are brought about as a result of the constriction which gradually leads to strangulation affect the mesentery, the blood vessels in the mesentery and in the bowel wall, and the wall of the intestine itself.

Twelve cases are illustrated to depict, in chronologic order, the seven stages in the evolution of a strangulated hernia, from the stage of mere congestion to one in which the intestinal loop becomes nonviable, the pathologic appearances in the formation of a hematoma, from the stage of dilatation of the veins in the mesentery to the stage when a hematoma may occupy a large portion of the mesentery, and the relation between the changes that take place in the mesentery and the bowel wall.

One may therefore conclude that the seven stages in the evolution of a strangulated hernia are: the stage of congestion; the stage of cyanosis with edema of the mesentery and visible dilated veins; the stage of appearance of hemorrhagic spots; the stage of cyanosis with hemorrhagic spots; the stage of cyanosis of the bowel wall with a hematoma in the mesentery; the stage of deeper cyanosis, with blue-black bands in the wall of the intestine, or a rough, wet, blotting paper appearance with a large or peripheral hematoma in the mesentery: and the stage of nonviable loop.

In every case the bowel wall that appears affected always corresponds to the portion of the mesentery which is also affected. The margin of the hematoma and the line of demarcation of the affected and normal parts of the loop always stop short sharply at the line of constriction.

Clinically, as a guide to the surgeon who is operating on patients with strangulated inguinal hernia, the cases can be divided into three groups, as follows:

One group consists of cases in which, on opening the sac, only the color of the bowel wall is found to be slightly altered, the bowel being normal in every other way, and peristalsis present as in the normal intestine. In such cases the intestinal loops may be immediately and safely returned into the abdominal cavity.

A second group consists of cases in which there are changes in the bowel wall and/or in the mesentery—changes affecting the color and condition of the bowel wall in varying degree and changes in the mesentery from its mere thickening to a large hematoma. When the changes are slight, the normal color returns within a short time after relief of the constriction and the application of packs of warm isotonic solution of sodium chloride. In more advanced cases it may take several minutes before any appreciable change in the color may be detected. Also, it may take some time for the peristalsis to reappear; but once the peristalsis has definitely begun, no matter what the color, feel, or odor of the bowel wall and/or of the mesentery may be, so long as reinduced peristalsis persists and there is no perforation, the loop may confidently be returned to the abdominal cavity. The presence or absence of peristalsis is the only sure token of the viability or nonviability of the bowel wall and is the only sure criterion as to whether the intestines should be returned into the peritoneal cavity.

In the third group are included the cases of strangulation in which the loop does not regain its peristaltic power and must therefore be considered as nonviable, even if the color and other changes are not those typical of a nonviable loop. In such cases appropriate surgical procedures must be carried out.

All 50 of the patients were males, and all were operated on under spinal anesthesia.

The hernias were of the indirect inguinal type and the majority were on the right side. There were no cases of bilateral strangulation.

In the majority of the cases (36, or 72 per cent) the sac contained loops of small intestine.

Of the 50 patients, 5 (10 per cent) died before their discharge from the hospital.

A brief description of the operation is included.

HARRY W. FINK, M.D.

Bintcliffe, E. W.: Mesenteric Vascular Occlusion. *Brit. M. J.*, 1947, 1: 50.

Occlusion of the mesenteric vessels is not common, the diagnosis is difficult, and the mortality rate is high. Believing that with wider recognition and earlier treatment the gloomy prognosis would be improved, the author discusses the anatomy, pathology, and etiology of the condition, and considers the diagnosis and treatment.

The occlusion primarily may be arterial or venous, the latter being more common, but with development of the condition both arteries and veins are involved. Arterial occlusion is usually due to an embolus derived from mitral stenosis, mural endocarditis, atheroma, pulmonary vein thrombosis, or pyemia. The superior mesenteric artery is more often involved than the inferior.

The cause of venous thrombosis frequently cannot be demonstrated; portal pyemia, or thrombosis secondary to appendicitis, diverticulitis, or pelvic infection is an important factor as all of the mesenteric venous circulation passes through the liver. Portal obstruction due to cirrhosis, peripheral venous thrombosis, and changes in the blood *per se*, such as polycythemia rubra, leucemia, or anemia may be the initial lesion.

The diagnosis of mesenteric vascular obstruction is difficult; the symptoms are essentially those of intestinal obstruction and peritoneal irritation. In cases of massive occlusion the element of obstruction may be overshadowed by signs of internal hemorrhage due to the large amount of blood which may be lost from the infarcted intestine. Some of this blood may become evident as hematemesis or melena. Salient points to note in attempting a diagnosis are: (1) history, or signs of a possible causative lesion—for example, endocarditis or cirrhosis; (2) melena or the revelation of blood on rectal digital examination or on enema; (3) the presence or previous history of vascular occlusion elsewhere; (4) the presence of a blood dyscrasia; and (5) severe pain, often greater on the left side, associated with signs of intestinal obstruction, free abdominal fluid, and sometimes a palpable mass. A differential diagnosis from other types of intestinal obstruction, perforated peptic ulcer, and acute pancreatitis must be made.

Exploratory laparotomy must be undertaken early; 95 per cent of patients who are untreated will die, and the time factor is as important as in perforated ulcer. Wide resection of the bowel and mesentery extending into healthy tissue, is required, and the presence of a second infarct involving another loop of bowel must not be overlooked. While the author recommends primary anastomosis of the small bowel segments, he believes that external drainage should be carried out in cases in which the colon is involved, with the continuity being reestablished at a later date.

Two cases of mesenteric venous thrombosis with complete recovery are presented. The possibilities of the use of heparin as an adjunct to surgery is suggested.

WAYNE CAMERON, M.D.

Altemeier, W. A., and Holzer, C. E.: Primary Torsion of the Omentum. *Surgery*, 1946, 20: 810.

Obesity and strenuous physical activity are probably important predisposing factors of omental torsion, although the true cause is probably still unknown.

The location of the mass in the right portion of the omentum, usually just above the level of the incision, supports the opinion of Morris that the right half of the omentum is longer and more subject to torsion.

Idiopathic torsion of the omentum is a rare condition, only 64 previous cases having been reported in the literature. Its cause is obscure, but adiposity and strenuous physical activity apparently are predisposing factors.

The condition is usually confused with acute appendicitis, but should be suspected in an obese or robust patient complaining of pain of several days' duration in the right lower quadrant of the abdomen, beginning during strenuous physical activity and being unassociated with vomiting.

The treatment of choice is excision of the gangrenous portion of the omentum with ligation of the vessels of its pedicle. The prognosis is excellent.

Primary torsion of the omentum should be looked for when laparotomy for acute appendicitis reveals a normal appendix and no other explanation of the clinical signs and symptoms, particularly the presence of sanguineous intraperitoneal fluid. A careful search is necessary to demonstrate the lesion, which is usually located in the right paracolic gutter or lower portion of the right upper quadrant of the abdomen.

JOSEPH GASTER, M.D.

GASTROINTESTINAL TRACT

Brummer, P.: On the Mucin Content of Gastric Juice. *Acta med. scand.*, 1946, 126: 384.

Five methods of mucin determination and their shortcomings are briefly discussed. The methods are based on (1) surface tension or viscosity, (2) measurement of the sediment after spontaneous centrifuging, (3) estimation of the nitrogen content of the gastric juice, (4) the reductive power of mucin measured either directly or after acid hydrolysis, and (5) the estimation of the turbidity produced by trichloracetic or salicylsulfonic acid precipitate.

The author sought first to separate mucin from the proteins in the gastric contents. Picric acid precipi-

tated the proteins completely, leaving the mucin totally unprecipitated. The mucin was then precipitated from the filtrate with alcohol. The author gives in detail the specific steps in his procedure.

Studies were made of 313 specimens of gastric juice from 145 persons, 50 of whom were healthy and 95 of whom suffered from various gastric disorders. The mucin content of the gastric juice varied from 0.15 to 1.5 per cent, the average being about 0.5 per cent. No definite relation between the macroscopic mucinity and the mucin content was found to exist as the colloidal state of mucin depends upon the acidity of the gastric juice. Therefore, mucin appears to be absent or of small quantity when acidity is high.

After test meals the mucin content was slightly higher than when the individual had an empty stomach. Histamine and insulin appeared to have no effect on the mucin content. Vagotomy has been reported as increasing the mucin content, but the few cases checked by the author did not support this finding.

The mucin content in cases of peptic ulcer and gastritis was within normal limits. This is contrary to the previous conception that a lowered mucus content exists in peptic ulcer and is of importance in its pathogenesis. No other clear evidence could be found of any difference between the mucus content of the gastric juice of healthy individuals and that of individuals suffering from various gastric disorders.

FREDERICK C. HOEBEL, M.D.

Efskind, L.: The Problem of Hypoproteinemia in Delayed Gastric Emptying after Stomach Resection. *Acta chir. scand.*, 1947, 95: 81.

The author takes issue with the commonly accepted thesis that postoperative hypoproteinemia is a direct cause of retention in gastrointestinal anastomoses. It is commonly accepted that the underlying cause of defective passage in such cases is due to edema of the anastomotic line.

The present study is based on the analysis of 312 patients who underwent a Moynihan type of gastric resection. The material is analyzed on the basis of the patients who had retention complications and in whom serum protein studies were made, both with and without protein therapy. Evidence of external edema was correlated.

Most of the patients with retention who showed signs of protein alterations were subjected to an intense parenteral administration of protein in the form of serum or blood. The effect was very variable. Only in a very few cases was there improvement of passage after protein restitution within a shortenough period of time to be significant. However, such treatment had a very positive effect on external evidences of hypoproteinemia, such as ankle edema.

It is concluded that in acute hypoproteinemia following gastric resection the edema about the anastomotic line is not demonstrably related to postoperative passage delay; in chronic hypoproteinemia with anemia the concomitant occurrence of these conditions with carcinoma is so frequent that a causal relationship between hypoproteinemia and edema about the anastomosis cannot be made with certainty. Furthermore, patients with external evidence of hypoproteinemic edema do not have a higher retention frequency than those without edema. Thus, it would seem that visceral edema plays a negligible role in delay of postoperative passage and explains the author's poor results with protein therapy for this postoperative complication. Protein therapy had a good effect on hypoproteinemic ankle edema but did not relieve obstructive symptoms related to possible edema of the anastomosis.

HAROLD LAUFMAN, M.D.

Zettergren, L.: On Pyloric Hypertrophy in Adults. *Upsala läk. fören. förh.*, 1946, 52: 83.

The author gives a report of 12 cases pathoanatomically diagnosed as hypertrophy of the pylorus in adults. The patients, of whom 4 were women, displayed protracted trouble of the gastroduodenitis type, some with signs of pyloric stenosis. In 10 cases in which carcinoma of the stomach was found, resection was performed. The sections revealed pronounced muscular hypertrophy, chiefly of the inner coat of the tunica muscularis in the antral portion of the ventricle; the condition was analogous to infantile pyloric hypertrophy. The hypertrophy reached its maximum at the pylorus and diminished in degree toward the oral part of the antrum. In most cases there were signs of chronic gastritis which, in the author's opinion, can play a certain role etiologically. There occurred neither ulcer nor cicatricial ulcer in the mentioned parts of the ventricle in any of the cases. The author considers that there is no connection with the infantile pyloric hypertrophy, but, similarly, spastic conditions are sometimes found to occur in the thickened musculature.

The possibility of making a clinically correct diagnosis is discussed. Therapeutically, internal treatment with diet and antispasmodics should have a good effect on the spasm in itself, while the performance of gastroenteroanastomosis should be a more adequate way of dealing with an organic muscularly conditioned pyloric stenosis provided there is no hyperacidity. The skill of the surgeon in estimating the nature of the pyloric thickening (hypertrophy, ulcer, or cancer) at the operation is the decisive factor in the choice between the last mentioned surgical method and resection. JOHN J. MALONEY, M.D.

Berg, B. N.: Gastric Ulcers Produced Experimentally by Vascular Ligation. *Arch. Surg.*, 1947, 54: 58.

Virchow's hypothesis that human gastric ulcers were vascular in origin led to several attempts to reproduce similar lesions in animals by ligation of the gastric vessels. For the most part no significant results were obtained.

In human beings the anatomic arrangement of the blood supply of the stomach is practically the same as that in dogs.

The rat's stomach is divided by a transverse ridge into two parts, a nonsecretory rumen, or forestomach,

and a glandular region, which is subdivided into an acid and enzyme-secreting fundus and a mucus-secreting antrum. The main blood supply is derived from an artery which divides into three branches just below the junction of the esophagus with the stomach. Direct communication between the main gastric vessels, characteristic of human beings and dogs, is absent in rats.

In rats, the main gastric vessels arise from a common stem and do not communicate directly with one another. They end separately, and anastomoses are made through terminal branches. The central part of the antrum is supplied by a single artery and vein, and when these vessels are tied, a collateral circulation must be established through long, narrow anastomotic channels which are distant from secondary sources of blood supply. The fact that centrally located ulcers develop in a large number of animals shows that the collateral circulation is inadequate to keep the antral wall intact. The periphery of the antrum is preserved, however, by short branches from adjacent vessels along the fundic border and the greater curvature.

Since the fundus is more vascular than the antrum and has a better collateral circulation, it is not surprising that fundic ulceration is uncommon after unilateral ligation. When bilateral ligation is performed, however, the fundus loses most of its blood supply and ulcers appear.

Despite extensive gastric ulcerations, all the rats kept for periods of 8 days or 16 days survived ligation. Various stages of repair were observed, but healing was more advanced in fundic lesions than in antral lesions. The difference in rate of healing was probably attributable to the more rapid establishment of a collateral circulation in the fundus than in the antrum.

There is nothing in the present experiments on igation to support the idea that enzyme action is related to the formation of ulcers. The experimental lesions are simply infarcts, and the size and depth of the defects left after separation of the dead tissue are determined by the effectiveness of the collateral circulation. HARRY W. FINK, M.D.

Baritell, A. La M.: Perforated Gastroduodenal Ulcer. *Surgery*, 1947, 21: 24.

Baritell reported his experiences with 88 consecutive patients operated upon for perforated gastroduodenal ulcers in a period of 3 years. His patients were skilled and unskilled workers in heavy war industry, most of whom were in the older age groups and physically disqualified from military service.

The author's "new and valuable" contribution concerns the surgical technique of closure of perforated gastric and duodenal ulcers which he utilized in 20 consecutive patients. This closure is accomplished by tacking a tag of living omental fat (gastrohepatic omentum) over the perforation with a few interrupted cotton sutures. No attempt is made to close the actual perforation as watertight closure is deemed unnecessary. This type of closure is particularly desirable in the presence of edema and induration at the site of perforation.

All free peritoneal fluid is removed by suction, particular attention being given to the spaces about the liver, the right gutter, and the pelvis. The abdomen is closed in layers by means of interrupted cotton sutures.

Upon the patient's return to his room, a nasal tube is passed into the stomach and continuous suction is applied for about 48 hours. At the end of this period, if the patient has good peristalsis, the tube is clamped off for a period of 4 hours. If there is less than 100 c.c. retention in the stomach, the tube is removed and oral intake of graduated amounts of water at hourly intervals is begun. After another 36 hours, the patient is given fluids as desired and placed on a graduated soft diet. It is very important that the suction be kept functioning while it is in place. Failure to keep continuous suction working the first 24 hours may result in disaster.

In the absence of bacterial peritonitis, early ambulation is instituted.

The mortality rate for the entire series of 88 patients was 1.1 per cent, which is believed to be the lowest published for significant numbers of this condition. ROBERT TURELL, M.D.

Ruffin, J. M., Grimson, K. S., and Smith, R. C.: The Effect of Transthoracic Vagotomy upon the Clinical Course of Patients with Peptic Ulcer. *Gastroenterology*, 1946, 7: 599.

Transthoracic vagotomy has resulted in complete relief of ulcer symptoms to date in each of 30 patients who had a chronic or recurrent peptic ulcer. In every case the ulcer had been present over a period of years and had failed to respond satisfactorily to conventional treatment. With the exception of 2 patients considered previously as psychiatric problems, the entire outlook on life and manner of living of this group of patients changed from that of semi-invalidism to that of a normal existence. The patients are now able to consume a full and unrestricted diet without ill effect.

As a rule, varying degrees of gastric retention developed in almost every patient who did not have a gastroenterostomy or a gastric resection prior to vagotomy. In 3 patients this was so severe as to require subsequent gastroenterostomy. In 2 patients with obstructive symptoms before operation a gastroenterostomy was performed at the time of vagotomy to prevent this complication. There is some evidence that gastric motility returns toward normal along with subsidence of dilatation. If there is any clinical or radiologic evidence of retention, pyloroplasty or gastroenterostomy is definitely indicated, either prior to or at the time of vagotomy.

A minor but interesting complication of vagotomy has been the development of a mild, transient diarrhea. There was no correlation between the diarrhea and the presence or absence of free hydrochloric acid. The explanation for this phenomenon is not yet apparent.

In general, the total volume of gastric secretion was markedly reduced by vagotomy, as well as the free hydrochloric acid content of the fasting stomach. While most of the patients showed a decrease or absence of free hydrochloric acid after vagotomy, yet in 4 patients it had no demonstrable effect on the free hydrochloric acid levels.

One of the most striking results of vagotomy is the immediate, complete, and apparently permanent relief of pain. It would seem that there are 4 possible explanations for this phenomenon: (1) the effect of anesthesia (ethylene ether); (2) interruption of the sensory pathways; (3) decrease or absence of free hydrochloric acid; and (4) decrease or absence of the peristaltic activity of the stomach. The effect of the anesthesia is transient and it would seem that the pain would certainly recur. It is difficult to prove that the pain pathways have not been interrupted. However, it is generally believed that visceral pain is carried by the splanchnic nerves. Furthermore, distention, traction, and probably heat and cold are perceived by the patient after vagotomy. It is improbable that the relief of pain is due only to the decrease or absence of hydrochloric acid, because in 4 patients who had normal free hydrochloric acid levels after vagotomy, the pain was immediately relieved and did not recur. Also, the introduction of free hydrochloric acid immediately after vagotomy and on several occasions later in 2 patients in this series and in 2 others not included in this report caused no pain, whereas, each patient had experienced typical pain after this procedure before operation.

Dilatation and delayed emptying of the stomach were a constant finding after vagotomy, except in those patients who had a previous gastroenterostomy or gastric resection. The most striking effect of vagotomy in this series of patients was the reduction or absence of gastric motility, so much so that one wonders if this is not the most likely explanation for the immediate relief of pain and subsequent healing of the ulcer.

CHARLES BARON, M.D.

Brown, C. H., Colvert, J. R., and Brush, B. E.: Gastroileostomy, A Rare Surgical Error; Symptoms and X-ray Findings. *Gastroenterology*, 1947, 8: 71.

The common complications of gastrojejunostomy are well known, namely, gastrojejunitis, gastrojejunal ulcer, nonfunctioning gastrojejunostomy stoma, perforation of a marginal ulcer, and gastrojejunocolic fistula. Rarer but none the less typical is the syndrome which occurs in patients in whom a gastroileostomy was done by mistake.

The authors briefly review the literature and find only 22 cases of gastroileostomy which have been reported. Because of the obvious importance of this surgical error and the necessity of promptly recognizing its signs and symptoms, the authors present 3 additional cases of gastroileostomy and analyze the syndrome.

The predominant symptoms are loss of weight, pain, vomiting, which may be fecal in type, and diarrhea. In 1 of the present cases reported it is significant to note that the patient actually tasted soap following a soapsuds enema on the fifth postoperative day. The stools may contain undigested food material. Whether diarrhea or vomiting predominates apparently depends upon the patency of the pylorus and the operative stoma when the stomach is filled. Malnutrition and weight loss may be marked due to interference with normal digestion and assimilation. Pain is a common symptom and may be severe. Hemorrhage was present in 3 of the 22 cases. Ileac ulcer was not as common as might be expected from the fact that unneutralized acid gastric chyme came in direct contact with the mucous membrane of the ileum.

X-ray examination, including particularly serial barium meal films of the gastrointestinal tract, is most helpful in diagnosis. Two of the 3 cases reported showed refilling of the stomach some hours after it had emptied, an x-ray sign not previously emphasized. This is probably the result of the fact that the barium passes through the patent pylorus into the duodenum, through the jejunum, and then through the gastroileal stoma back into the stomach.

In the authors' series of 3 cases, simple disconnection of the gastroileostomy promptly produced satisfactory results. However, in 1 of the patients a partial gastrectomy was also performed.

EDWARD F. LEWISON, M.D.

VanLiere, E. J., Stickney, J. C., and Northup, D. W.: Comparative Study of the Effect of Anesthetic Agents on the Propulsive Motility of the Small Intestine. *Gastroenterology*, 1947, 8: 82.

In studying the problem of propulsive motility of the small intestine as affected by various anesthetic agents, the authors are underscoring and trying to shed additional light upon the well recognized fact that disturbances of intestinal motility play a very important role in the incidence of morbidity and mortality in the postoperative period. It is, however, unfortunate that "postoperative ileus and related disorders cannot be explained on the basis of a single etiological factor." The type and duration of the operation as well as the care and gentleness with which the intestines are handled are all important factors, among many others, in the problem of postoperative complications. Nevertheless, any experimental evidence which seeks to provide additional information on the incidence and cause of such disturbances following abdominal surgery is of value even if the results are somewhat confusing and the interpretation subject to cautious consideration.

The effects of cyclopropane, chloroform, ether, ethylene, nitrous oxide, and a number of barbiturates on the propulsive motility of the small intestine were studied experimentally in 128 dogs.

In group "A" a charcoal mixture was given by stomach tube to normal dogs. At the end of 30 minutes they were sacrificed and the distance the mixture had been propelled by peristaltic action was measured. In group "B" the dogs were first anesthetized and the charcoal mixture put directly into the

duodenum after it had been exposed by an abdominal incision. These animals were likewise sacrificed after 30 minutes and the distance that this charcoal mixture traversed the intestine was also measured.

The results obtained by these two experimental approaches were not entirely comparable. Perhaps the most striking feature to be noted was that the charcoal mixture moved much farther along the small intestine when given by stomach tube than when put directly into the duodenum. The authors suggested that the fact that the second procedure required abdominal surgery was a rational explanation of the unexpected decrease in intestinal motility.

In group "A" the anesthetic agents may be arranged in the following order with respect to their ability to depress propulsive motility of the small intestine:

1. Chloroform (depressed motility most)
2. Nitrous oxide
3. Cyclopropane
4. Ethylene
5. Ether
6. Pentothal
7. Nembutal

In group "B" the experimental results showed that their order was as follows:

1. Barbital (depressed motility most)
2. Ether
3. Amytal
4. Nembutal
5. Chloroform
6. Pentothal
7. Ethylene
8. Cyclopropane
9. Nitrous oxide

The clinical significance of these findings was briefly discussed. EDWARD F. LEWISON, M.D.

Alvarez, L. F., and Farinas, P. L.: Postbulbar Duodenal Ulcers. *Gastroenterology*, 1947, 8: 1.

Peptic ulcer involving the postbulbar area is more frequent than is supposed, in support of which statement the authors cite their 16 cases found over a 5 year period. These lesions are easily overlooked because they are best seen in the oblique position and necessitate speed in the roentgen examination, requiring the use of a non-Bucky technique in which the speed can be no less than ½ second and preferably ⅓, or ¼, or faster.

The report includes observations on:

1. The age and sex. All 16 patients were males having an average age of 44 years, compared with an average age of 33 years in the patients with bulbar ulcer.

2. Incidence. The incidence of postbulbar ulcers compared to bulbar ulcers was 1 to 17.

3. Location of the lesion. The most frequent site is the medial aspect of the superior duodenal angle, slightly within the initial portion of the descending duodenum, this being the area beyond the bulbar vertex including the supra-ampullary region. The lesions are less frequently found as one approaches the ampulla of Vater and are exceedingly rare beyond this area. The ulcers in the authors' series were located as follows: 4 on the medial aspect of the superior angle; 8 on the medial aspect of the descending duodenum just beyond the superior angle; 1 ulcer at the same level but on the outer wall; 2 ulcers *en face*, just distal to the superior angle; and 1 double (kissing) ulcer just beyond the bulb.

4. Symptoms. The symptoms of postbulbar ulcers are not classical, although 75 per cent of the authors' patients complained of a typical duodenal ulcer type of pain. A discussion is included of the atypical type of pain occasionally seen in these cases.

5. Gastric analysis. A grade 2 fasting hyperchlorhydria was found in all but 1 of 13 patients studied.

6. Hemorrhage. The previously described hemorrhagic tendency of these ulcers was confirmed by the authors, whose series showed a 37 per cent incidence of bleeding compared to that of 12.3 per cent in their cases of bulbar ulcer.

7. Diagnosis. The diagnosis of ulcers beyond the bulb is essentially roentgenological. More attention should be given to the remaining duodenum during x-ray examination of the stomach and duodenal bulb, and from the superior angle stress should be placed upon study of the mucosa as well as upon the finding of obstructive lesions or diverticula in this region.

8. Roentgen diagnosis. The most characteristic roentgenological sign of postbulbar ulcer is the niche defect, corresponding to its crater, and presenting characteristics similar to those found in bulbar ulcers. These niche defects may occur *en face* or on either border, but are usually located on the inner border just beyond the bulb. In this site they are frequently hidden in the frontal projection by either the pyloric antrum or the bulb itself. Rarely, they are found on the outer border. The niche may be round, oval, or irregular in shape. The majority are small and shallow, but they may reach the size of a nickel. When the duodenum is completely filled with barium, the niche *en face* may escape visualization, and a relief view of the mucosa is necessary to outline it. Generally, other deformities due to spastic phenomena, cicatrization, and retraction from scar formation and mucosal changes are associated with the niche defect. Spasm may appear as an incisura on the opposite curvature to a niche located on the inner border. It may appear as a contraction of the duodenum at the site of the niche, particularly in ulcers *en face*, or as a contraction of the ulcer region. The mucosal folds may appear thick and irregular or cushion-shaped, and the duodenal margins undulant or irregular.

9. Differential diagnosis. One must consider diverticula, neoplasms involving the major duodenal papillae, and duodenitis. Diverticula are the most important. They are most frequently found in the ampullary region of the descending duodenum. The longitudinal mucosal folds found in the neck of the diverticulum are a valuable roentgenological sign, and the sac normally presents regular and well defined borders, in contrast to the niche.

10. Clinical course. This is essentially the same as that of a bulbar ulcer. Medical therapy was efficacious in 10 of the authors' 16 cases, being associated with both clinical and roentgenological improvement, although in some cases there was a persistence of duodenal irritability and cicatrization.

EUGENE J. AUDI, M.D.

Kittle, C. F., Jenkins, H. P., and Dragstedt, L. R.: Patent Omphalomesenteric Duct and Its Relation to the Diverticulum of Meckel. *Arch. Surg.*, 1947, 54: 10.

A presentation of the history, embryology, anatomy, pathology, relation to other congenital anomalies, and sex incidence of the diverticulum of Meckel is given. The relationship between it and the patent omphalomesenteric duct is discussed.

One hundred and two cases of patent omphalomesenteric duct and 26 additional cases in which prolapse of the intestine occurred through this structure were collected from the literature. These are briefly summarized.

Two new cases of uncomplicated patent omphalomesenteric duct and 1 case with prolapse are presented.

The clinical features, diagnosis, and treatment of this condition are discussed.

Operation for excision of the patent omphalomesenteric duct should be undertaken as soon as the condition is diagnosed to avoid the hazard of intestinal prolapse.

JOHN J. MALONEY, M.D.

Gardiner, R. H.: Volvulus of the Cecum. *Brit. M. J.*, 1947, 1: 83.

Volvulus of the sigmoid is a well known condition, while volvulus of the cecum is still believed to be rare. The author believes it is not so uncommon as supposed and cites 15 cases reported in 5 years, including 3 personal cases. He believes the condition should be more widely recognized since the mortality rate is very high if treatment is withheld. Partial torsion may occur in recurrent attacks over a period of years, sometimes culminating in an acute complete torsion. It also may cause obscure abdominal pain or discomfort, or stimulate some cases of subacute appendicitis. Obstetricians should realize that this condition is likely to complicate pregnancy and the puerperium.

Wolfer (1942) reported 304 cases from the literature with mortality rates between 50 and 60 per cent in operative cases and rising up to 100 per cent in nonoperative cases. It should be possible to bring this high mortality rate down with early diagnosis and treatment.

In the third stage of the embryological rotation of the gut, the cecum lies beneath the liver and descends to the right iliac fossa, finally becoming fixed to the posterior abdominal wall, and its mesentery disappears. If this fixation and disappearance of the mesentery fails to take place, the cecum and ascending colon are variably mobile in accordance with the length of this mesentery. Sometimes there is even a common ileocecocolic mesentery. This renders the cecum and a varying amount of the right half of the colon liable to torsion. Points of fixation at the base of this mesentery—at the hepatic flexure or where the transverse colon crosses the duodenum—frequently act as hubs around which the torsion occurs.

The frequency of this nonfixation of the cecum and right colon is given at from 15 to 25 per cent. Any of the cases in this group may develop a volvulus. Rarer causes are errors of rotation (nonrotation, reversed rotation, and nondescent of the cecum). The twist more commonly occurs in a clockwise direction.

Males are afflicted more often than females in a 3 to 1 ratio, and one-half of the patients are between the ages of 20 and 40. Exertion or heavy occupations may account for the male preponderance. Trauma, sudden or gradual changes in position of the viscera, (as seen in pregnancy or the puerperium), mesocolic inflammation, dietetic errors, gaseous distention, or violent purgation may be exciting causes.

The author divides the cases into 3 types, according to their rate of onset and manifestation of symptoms.

1. Acute cases come on within a few hours and cause violent abdominal pain, vomiting and constipation followed by abdominal distention—signs of acute obstruction. These cases are rapidly fatal and must be subjected to operation in good time.

2. The subacute cases give a history of several hours up to, more often, 3 or 4 days of variable abdominal discomfort or distention, pain, and tenderness. The pain may be epigastric or in the right lower quadrant. The temperature and pulse often remain normal. The patient will nearly always recall similar attacks of a milder nature which have passed off without incident (indicating a volvulus that has righted itself). Tenderness is usually present and is localized over the distended gut and the area of peritonitis developing over and around it. Distention is usually gross, and roentgenograms of the abdomen will frequently be diagnostic.

3. The chronic cases show a transient partial volvulus which sooner or later untwists. These cases are associated with right lower quadrant pain, tenderness, and varying degrees of distention. Histories of distention suddenly relieved by the passage of a large amount of flatus are often of great importance in the diagnosis.

This condition has been reported as an acute complication of pregnancy or the puerperium. Rose believes that volvulus may be the cause of distention early in the puerperium and that laparotomy should be seriously considered if it refuses to respond to treatment in 24 hours post partum.

The treatment of volvulus consists of early laparotomy and care of the gut according to the state in which it is found. If it is viable, derotation with or without fixation, or derotation with a cecostomy to decompress and drain the bowel is indicated. If it is gangrenous, exteriorization and removal with the cautery and subsequent closure of the enterostomy, or resection (right hemicolectomy) and anastomosis of the ileum to the transverse colon is indicated.

Adequate preoperative treatment as far as time will allow is important. Blood and fluid should be replaced. Gastric suction and lavage are of value before and after operation.

Fixation of the viable bowel may be achieved by Waugh's method, by fixing the appendectomy stump to the anterior abdominal wall with a pursestring suture, or by cecostomy fixation. Very careful handling of the distended friable gut is essential.

The author's 3 cases are presented in detail.

ROBERT R. BIGELOW, M.D.

Mirvish, L.: Diverticulitis of the Cecum. *Clin. Proc.*, Cape Town, 1946, 5: 354.

This is a case report of a patient with multiple diverticulitis of the colon. The interesting phase of this report is that there were several diverticula of the acquired type in the cecum. Solitary diverticula of the cecum are encountered not infrequently; they are usually congenital in type. Most cases of cecal diverticulitis are diagnosed as acute appendicitis when one of the cecal diverticula becomes inflamed.

In this case the clinical picture did not appear to resemble acute appendicitis with abscess formation, but seemed more like carcinoma of the cecum. The diagnosis was confirmed by roentgenography, and the patient recovered without surgery.

HAROLD LAUFMAN, M.D.

Koch, F.: A Contribution to the Operative Treatment of Cancer of the Rectum. *Acta chir. scand.*, 1947, 95: 145.

In the Surgical Clinic of Malmö in Sweden the favored procedure in the treatment of carcinoma of the rectum during the last 30 years has been to operate in one stage and preserve the anal sphincter whenever possible. The reported material consists of 276 cases of rectal cancer.

The majority (56 per cent) of patients in this series did not seek medical aid until symptoms had persisted 6 months or more. Twenty-one per cent of the patients sought medical aid earlier, but the nature of the lesion was not diagnosed. The author found that radical operability in delayed cases was reduced to 17 per cent, while in all other cases the operability was 36 per cent. These figures are considerably lower than in most large series reported in recent years.

The choice of method for radical operation is largely governed by two considerations: whether the sphincter can be spared and whether the operation can be performed in one stage. It is the author's contention that, whenever possible, the sphincter should be preserved, and every attempt is made to complete the operative procedure in one stage. In the present series there were 87 radical operations, of which 66 were resections with preservation of the sphincter. There was only a 7.5 per cent incidence of postoperative urinary retention in the series. All of the patients in these cases recovered after a few days of catheterization with no serious complications of the genitourinary tract. The author attributes this excellent record to great care in avoiding damage to the blood supply of the bladder.

The immediate mortality was 21 per cent. In 8 cases the cause of death was peritonitis originating from the wound; in 6 it was failure of the circulatory apparatus; in another 6 the patients died in the hospital 1 month or more after surgery from various complications such as pneumonia and thromboembolic phenomena. If the latter 6 cases are included, the hospital mortality was 30 per cent. Apparently all patients in whom the sphincters were preserved had good control upon discharge from the hospital.

Follow-up examination revealed that there was a 64 per cent incidence of 3 year cures and a 50 per cent incidence of 5 year cures. None of the patients who were re-examined complained of defective control of the anal sphincter. On the basis of the material in this report, the author believes that preservation of the sphincter does not appreciably alter the results as compared with those of other radical resections and therefore recommends this procedure whenever feasible. He claims that disturbances in sphincter control and the presence of persistent fecal fistulas have been overestimated in the literature, especially since neither of these complications occurred in any of his cases.

HAROLD LAUFMAN, M.D.

Swinton, N. W.: Pruritus Ani. *N. England J. M.*, 1947, 236: 169.

The etiology of anal pruritus is not definitely known and there may be several etiologic factors involved in many of the cases. Some precipitating factor begins anal pruritus. It often follows a period of diarrhea, constipation, fatigue, worry, or nervous tension. The symptoms may be transient or may set up a cycle of scratching and itching that is progressive. It is of value in all cases for the doctor to spend time with the patient, talking over the possible causes and explaining the mechanism of the scratch-itch cycle and the importance of avoiding scratching.

The anorectal area contains a sweat apparatus, the apocrine system, which is part of the sexual glandular system. Its excretion is alkaline and contains protein and excess carbohydrate. It is responsive to emotion and sexual tension.

Fungus infections have been found to be present in as high as 60 per cent of the cases of anal pruritus by some writers, but the author's study did not support these findings. Various bacterial organisms, probably of little importance, have been described.

Food allergies have occasionally been found, but it is difficult to evaluate them. Excess carbohydrate in the diet increases the alkalinity around the anus and increases the local hydration. Fruit juices have a similar effect and alcohol may be important as a peripheral dilator.

The sodium salts of fatty acids in soap, the sulfite in some toilet papers, the phenolphthalein in laxatives, and the mercury in some surgical lubricants may increase the local irritation.

The psychogenic factor is important, and nearly all patients with an intractable itch give histories of

episodes causing tension. There is an anal erotic type of anal pruritus. Sexual problems enter into many cases.

Anal abrasions, fissures, fistulas, hemorrhoids, skin tags, a contracted anal ring, or infected crypts may be precipitating factors.

Therapy of these cases must stress treatment of the entire patient as contrasted with the usual tendency toward intense local therapy. Rest, relaxation, and relief from tension must be attained by sedation and hospitalization if necessary. Alcohol, carbohydrates and roughage are reduced in the diet. Cleanliness is stressed; cotton and water should be used to cleanse the area, and toilet papers, soap, and direct manual contact with the anus should be avoided. Potassium permanganate (65 mgm. to 1 liter) in hot water is used in mild cases and patients are advised to sit in it as often as necessary. Burrow's solution, and dilute Castellani carbolfuchsin paint, with or without resorcinol, are helpful. Ointments are avoided.

There are definite indications for surgery in these cases, but they are few and are becoming less with the greater experience in the handling of such cases. Alcohol and other injections have the common denominator of producing local anesthesia and should be reserved for severe cases. When such treatment was indicated, the author had his best results following the Buie technique of alcohol injection.

FREDERICK C. HOEBEL, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Ivy, A. C.: Motor Dysfunction of the Biliary Tract; An Analytical and Critical Consideration. Caldwell Lecture, 1946. *Am. J. Roentg.*, 1947, 57: 1.

Does biliary dyskinesia exist as a clinical entity and how can it be diagnosed? This article is an analysis of the present state of the problem.

Anatomically, the gall bladder has a fibromuscular layer, but muscular fibers are sparse in the cystic, hepatic, and common bile ducts. Embryologic evidence shows that the sphincter of Oddi develops independently of the duodenal masculature. There are four intrinsic muscles in the sphincter and ampulla of the adult. There are two longitudinal bundles which shorten the duct and erect the papilla. There is an annular sheath around the common duct from the point where it enters the duodenal wall to where it joins the pancreatic duct. There is an annular sheath around the terminal end of the pancreatic duct in about one-third of the adults and around the ampulla in about one-sixth of the adults. Hypertrophy of the sphincter of Oddi has been reported and is said to occur after cholecystectomy.

Physiologically, the gall bladder evacuates under the force of its contraction which is initiated by cholecystokinin, a hormone elaborated by upper intestinal mucosa when in contact with fat or partially digested protein. When injected intravenously, cholecystokinin will evacuate the gall bladder in dogs and man. In dogs the maximum force of the contracting gall bladder amounts to from 20 to 25 cm. of water pressure, which is lower than the secretory pressure of bile and pancreatic juice, which ranges from 25 to 30 cm. of water pressure.

In all animals that have a gall bladder, we may believe, the common duct possesses a sphincter mechanism which is intimately co-ordinated with duodenal tone and motility but which may also act independently.

The sphincteric mechanism can exert a resistance to the flow of fluid amounting to from 60 cm. to 80 cm. of water pressure in the dog, and therefore, presumably, it is possible for a spastic sphincter to resist a flow greater than the capacity of the gall bladder to contract and greater than the secretory pressure of the liver. The normal resistance of the sphincter in the cholecystectomized human being ranges from 0 to 23 cm. of water pressure, and usually ranges from 10 to 15 cm. of water pressure.

In the dog after a meal of injected cholecystokinin, the gall bladder contracts and the sphincter of Oddi relaxes. In man the sphincter is known to relax in the presence of a fatty meal. This demonstrates a probable reciprocal innervation, which if disturbed could cause pressure in the biliary tract and produce symptoms.

The source of pain in the biliary passages has been investigated, but in human beings the evidence is meager, principally because experiments were made in the presence of inflamed bile passages in which the pain threshold was lowered. In dogs, 27 cm. of water pressure, which is approximately equivalent to the maximum contraction of the gall bladder and secretory pressure of bile, produced pain. All experiments through "T" tubes in human beings indicated that a sudden increase in intraductile pressure produced pain, while a gradual increase did not; and that the greater inflammation of the passages was accompanied by a lower pain threshold. Duodenal spasm as the cause of pain was ruled out in one series of experiments by the presence of an intraduodenal balloon.

Normal patients and patients operated upon some time previously have been investigated in three ways. First, with a duodenal tube in place, olive oil was injected to cause contraction of the gall bladder. Pilocarpine, causing sphincter spasm, was then injected; this produced distress and the flow of bile ceased. Atropine was then injected and the distress disappeared as the bile reappeared. In the second experiment dehydrocholic acid, which causes brisk bile formation, was injected intravenously into a patient with stenosis of the common duct and caused pain. This was confirmed on the dog. In the third experiment, secretin-cholecystokinin was injected intravenously in a patient following the introduction of a duodenal tube and obtaining bile. In 3 of the 19 patients the flow of bile ceased before the injection; only clear pancreatic juice was obtained following the injection, and the patient developed right hy-

pochondrial distress. Magnesium sulfate in the duodenum relieved the distress and produced a copious bile flow.

Only manometric studies can make a diagnosis of motor dysfunction of the sphincter of Oddi at present. In the presence of a gall bladder, delayed evacuation during a cholecystogram has been considered of diagnostic aid but evidence is contradictory and meager. The stimulus of a fatty meal is too variable for standardization of the procedure. Visualization of the hepatic ducts with a normal gall bladder *in situ* may occur with or without pain, generally the latter, and is, therefore, neither helpful nor easy to explain.

The author suggests studying such patients with secretin-cholecystokinin as outlined in conjunction with cholecystography and attempts to visualize the hepatic ducts during cholecystography by feeding three egg yolks in milk. The latter could also be introduced into the duodenum directly and the patient given morphine hypodermically to contract the sphincter of Oddi in order to observe whether pain occurs during gall bladder contraction.

Postcholecystectomy colic in the absence of organic causes, or gross liver or bile duct disease must be considered as being due to sphincter spasm. In some cases if the colic is induced by 1/6 gr. of morphine the diagnosis may be strongly suspected. A more radiopaque dye than now exists and which would be excreted by the liver in sufficient quantities to visualize the ducts without concentration should help in the diagnosis. FREDERICK C. HOEBEL, M.D.

Varco, R. L.: Intermittent External Biliary Drainage for Relief of Pruritus in Certain Chronic Disorders of the Liver. *Surgery*, 1947, 21: 43.

Pruritus caused by certain chronic disorders of either the hepatic parenchyma or the intrahepatic biliary system (chronic hepatitis or cirrhosis) causes unremitting annoyance and is intractable to the therapy now customarily employed dihydroergotamine (intramuscular), procaine hydrochloride (intravenous), sedatives, hypnotics, and analgesics.

Varco reasoned that if it is true that the intractable pruritus is caused by the abnormal retention of bile salts then the development of a method for the reduction of the serum bile salt should constitute a rational therapeutic approach to this problem. As a result of the previous studies by Whipple and his collaborators, it was believed that because 90 per cent of the total quantity of bile salts secreted each 24 hours is resorbed from the intestinal tract, recirculated through the liver and then re-eliminated in the bile, only pre-enteric deviation of the bile would reduce the serum bile salt level.

Upon translating these conjectures into surgical procedures it was determined that intermittent external biliary drainage suffices to attain and maintain prompt and virtually complete relief from the type of pruritus under consideration. The most effective operative procedure for this purpose is cholecystostomy and drainage of the common bile duct with a T-tube, size 10 to 12 French.

Small quantities of bile salts were given orally upon 3 occasions to patients who had an external biliary fistula. Pruritus promptly returned and then disappeared with the maintenance of intermittent external biliary drainage. ROBERT TURELL, M.D.

Mallet-Guy, P., and Jeanjean, R.: Surgical Eventualities in So-Called "Medical" Jaundice (Éventualités chirurgicales dans les ictères dits "médicaux"). *Lyon chir.*, 1946, 41: 389.

The author discusses the possible surgical complications of infectious jaundice, particularly dyspeptic disturbances persisting after subsidence of infectious jaundice, relapsing episodes of jaundice, and abnormal prolongation of jaundice.

If surgical exploration for one of these conditions fails to reveal a lesion in the biliary tract or the head of the pancreas, the symptoms are probably due to: (1) hypertony of the sphincter of Oddi, (2) hypotony of the spincter of Oddi, or (3) a variable degree of compression of the common bile duct usually associated with a chronic pancreatitis.

These may be differentiated from one another by manometric and roentgenographic studies of the biliary duct system made by cannulating the biliary tree at the time of operation. Usually the surgeon will find a precise disturbance of biliary function, either a relative degree of obstruction due to pancreatitis or a hypertonic or hypotonic sphincter of Oddi.

For obstruction due to pancreatitis, cholecystostomy is indicated. Biliary anastomosis is not indicated unless the obstruction is great enough to indicate some other condition than infectious jaundice. Similarly, for cases of hypertonicity of the sphincter, cholecystostomy appears to interrupt the evolution of sphincter spasm. However, when the hypertonicity is too severe to be relieved by simple drainage, transduodenal sphincterotomy is preferable and restores a more normal tonicity of the sphincter. If, on the other hand, a state of atony of the biliary tract and sphincter exists, simple drainage of the gall bladder is the preferred treatment. In some of these cases splanchnicectomy also is of value.

EDWARD W. GIBBS, M.D.

Clavel, C., and Dumas, J.: Acute Calculous Cholecystitis in Children (La cholécystite calculeuse aiguë chez l'enfant). *Lyon chir.*, 1946, 41: 411.

Acute calculous cholecystitis is rare in infants and children. The authors collected 102 cases and found that the greatest incidence of lithiasis in children occurred prior to the age of 1 year and just before the age of 15 years. Calculous cholecystitis is rare before the fifth year of age. Before the age of 10, acute cholecystitis occurs more frequently in males, but after the age of 10 the incidence is greatest in females.

The classical list of predisposing causes of calculous cholecystitis in children includes typhoid fever, scarlatina, grippe, pneumonia, upper respiratory infections, gastrointestinal illness, intestinal parasites, appendicitis, and heredity. However, in many cases

neither the antecedent history nor the operative findings suggested any definite predisposing cause.

There is nothing characteristic about the pathologic findings in infants. Calculi of varying size, number, and chemical composition are described. Examination of the gall bladder wall and lumen discloses the characteristic findings of acute cholecystitis, of catarrhal, suppurative, or gangrenous type.

There is no doubt of the congenital origin of calculi for they have been described in the newborn and even in the fetus. In infants and children the pathogenesis appears to be the same as in adults except for the sudden increase in frequency of the disease in girls just before puberty, which suggests an endocrine or vagosympathetic disturbance.

In a clinical study of 22 cases the authors found 8 cases of suppurative cholecystitis, 1 case of gangrenous cholecystitis, 10 cases of catarrhal cholecystitis, and 3 cases of cholecystitis with the complication of perforation or fistula formation.

Appendicitis is the most common diagnostic error. However, in infants there are a certain number of gall bladder syndromes without lithiasis; namely, typhoid cholecystitis, scarlatina cholecystitis, external compression of the biliary tract by adenopathy, intestinal worms, and acute noncalculous cholecystitis. Also, lithiasis is seen without cholecystitis and in some cases of hemolytic icterus.

The diagnosis is based on symptoms of pain, contracture, high fever, and leucocytosis with a predominance of polymorphonuclear cells, added to the picture of noncomplicated lithiasis producing painful crises and hepatic colic. If this picture can be distinguished from other acute peritoneal syndromes by its localization and clinical history, an accurate diagnosis can be made.

Congenital lithiasis, often associated with malformations of the biliary passages, is frequently fatal. Acquired cholelithiasis, if recognized and treated surgically, bears a good prognosis.

The authors recommend early operation. Although cholecystostomy might at first seem to be particularly indicated in infants and children, the frequently encountered advanced changes in the gall bladder wall will often necessitate removal of the gall bladder. EDWARD W. GIBBS, M.D.

Muir, J. B. G.: Surgical Hazards in the Treatment of Cholecystitis and Cholelithiasis. *Austral. N. Zealand J. Surg.*, 1946, 16: 14.

The author reviews the surgical hazards and results of 421 operations on the biliary tract. The pathological condition, the type of operation performed, and the causes of death in each group are discussed.

Two hundred and seventy-five cholecystectomies were performed for chronic cholecystitis and cholelithiasis, with 6 deaths—one due to pulmonary embolism, 3 to hepatorenal syndromes, and 2 to internal hemorrhage. Cholecystostomies were done in 3 cases, with no deaths.

When surgical treatment was carried out in the presence of acute inflammatory changes in the gall bladder, the mortality rose from 2.18 per cent to 18.4 per cent. In all, 103 cases were recorded in this group and the pathological findings at operation included acute cholecystitis with commencing gangrene, perforation and peritonitis, cholecystoduodenal fistula, pancreatitis communicating with liver hydatid, and empyema of the gall bladder.

Cholecystectomy performed in patients with acute cholecystitis carried with it a mortality of 20.6 per cent whereas the mortality following cholecystostomy was 15 per cent, despite the fact that it was selected for the poor risk cases.

The question whether cholecystitis in the acute stage should be treated conservatively or with immediate operation is discussed at length. Muir believes that generalization is impossible and that each case of acute cholecystitis should be treated on its merits, the patient being under observation in the hospital. Consideration of the local pathological process should always be borne in mind. Apart from a small proportion of welchii infections, the organisms causing cholecystitis are usually Bacillus coli and streptococci of low virulence. In the early stages the inflammatory process is catarrhal in type, and limited to the mucous membrane and submucous tissue. Provided there is no obstruction, the tendency in first attacks is to subside, leaving local adhesions on the peritoneal surface of the organ and a thicker gall-bladder wall.

The theory is advanced that in a number of cases of acute cholecystitis, mechanical and circulatory effects rather than bacterial infection are responsible for the principal pathological changes. The veins draining the gall bladder are much more closely incorporated with the cystic duct than is the cystic artery and so lead to edema, congestion, and infarction.

The necessity for immediate operation on the tender, palpable gall bladder, it is argued, is based on the fact that the tension in the gall bladder may become so great that the blood supply is compressed, resulting in gangrene, that there is seldom any clinical indication during an attack of acute cholecystitis that pus is present, and that perforation in a "watched" case is frequently the first indication that the attack is not subsiding.

These complications of nonresolving acute cholecystitis are arguments in favor of early surgical intervention. There is little doubt that in a younger type of patient, whose liver function has not been impaired by numerous attacks of cholangitis, cholecystectomy performed in the early catarrhal stage, when the normal surgical anatomy is not badly obscured by inflammatory exudate—that is, during the first forty-eight hours—is not a very formidable technical undertaking, and the risk is not great. It must be remembered, however, that these patients are not always seen at that stage and have usually been sick at home for several days before admission to the hospital, so that the day of admission is by no means the first day of the attack. A careful history and assessment of the local pathological process as a

guide to the time of operation are therefore most necessary. If the patient is not seen until the fifth or sixth day, the gall bladder will be surrounded by adhesions and considerablelocal serofibrinous exudate will be present. There will be difficulty in securing the proper plane of separation of the gall bladder from the liver and, also, owing to troublesome oozing and friability of tissue, in subsequently peritonealizing the gall-bladder fossa when the organ has been removed. In such cases the hepatoduodenal ligament is always swollen and edematous, and the veins between its folds are engorged and bleed readily, quite unlike minor vessels encountered there in cases of chronic cholecystitis. The cystic lymph glands will also be enlarged and inflamed.

These facts will make the clear dissection of the cystic duct a difficult matter; and failure to secure the cystic artery, and the perpetual bugbear of damage to the common bile duct become real dangers. In such cases these dangers can be avoided by performing a cholecystostomy (if necessary, under local anesthesia) should immediate surgery be warranted by the progress of the condition.

Careful analysis of the records of acute cases in the series showed that one-half of the operations were carried out within 48 hours of admission of the patient to the hospital, and in about 50 per cent of the acute cases in which operation was performed actual empyema of the gall bladder existed. Because of this, it is believed that had cholecystostomy been performed only as a temporary life-saving measure, instead of cholecystectomy, 5 deaths from reactionary hemorrhage and 2 from biliary peritonitis would presumably not have occurred, and the mortality figure would have been reduced to 11.6 per cent.

Conversely, it is argued that of 243 admissions on the medical side of the hospital for cholecystitis, and investigated for suspected cholelithiasis during this same period, the condition in 54 patients was diagnosed as acute cholecystitis, and all except 3 recovered satisfactorily, which confirms the estimate that only from 5 to 7 per cent of acute cases progress to a stage requiring urgent operation.

In the series, exploration of the common bile duct for the removal of stones was combined with cholecystectomy and cholecystostomy in 34 cases with 7 deaths—a mortality rate of 21 per cent—which is a very serious rise compared with 2.15 per cent in uncomplicated cholecystectomy.

Three patients were operated upon for stones overlooked in the common bile duct at a previous cholecystectomy. In each case the second operation was performed within 2 years of the previous operation. In 1 case the stone was impacted in the sphincter of Oddi, and was removed by a transduodenal approach; in the 2 other cases it was removed through the supraduodenal portion of the duct. All 3 patients had suffered from repeated attacks of intermittent jaundice and pain, with occasional attacks of fever since cholecystectomy, and all made a good recovery.

Two patients with common duct stricture were admitted for treatment following cholecystectomy performed for acute cholecystitis, 9 months and 1 year previously. One patient had submitted to 2 operations to relieve the stricture. Temporary success for 6 months was obtained, but the old symptoms returned and death from liver failure took place 1 year later. The second patient is well 2 years after operation, but from time to time suffers from attacks resembling mild biliary colic.

The causes of death in order of frequency were pulmonary complications such as embolus and pneumonia, internal hemorrhage (secondary and reactionary), liver failure, hepatorenal syndrome, uremia, biliary peritonitis, congestive heart failure, hematemesis, and hyperpyrexia.

STEPHEN A. ZIEMAN, M.D.

Tanna, J. F.: Splenectomy; An Analysis of 38 Cases. *Surgery*, 1947, 21: 46.

The author analyzed the results of 38 splenectomies performed at the Charity Hospital, New Orleans, during the period from January 1, 1939 through 1945, exclusive of those done for trauma or those done during the course of esophagectomy or total gastrectomy.

Eleven splenectomies were done for congenital hemolytic anemia. The follow-up studies, ranging from 3 months to 3 years, showed excellent results in 8 of the 11 patients. There was slight improvement in 1 patient in whom it was believed that accessory spleens had not been removed, and 2 patients died. One patient died immediately after operation from peritonitis and pneumonitis, and the other died 2 years later.

One splenectomy was performed for acquired hemolytic anemia. This patient died on the first postoperative day from hemorrhage caused by a slipped ligature upon the splenic pedicle.

Four splenectomies were performed for idiopathic thrombocytopenic purpura. These were done under general anesthesia. All of the patients had received blood transfusions before, during, and after the operation. The results were excellent in 3 patients; the fourth one died as a result of "continuous oozing from the splenic bed."

Ten splenectomies were performed for Banti's disease. Only 2 patients obtained fairly good results from this procedure; 4 patients showed no improvement in their condition, and 4 died.

In these cases it is necessary to determine the site of portal obstruction before rational therapy can be instituted. One can predict, on the basis of liver function chemistry, whether the portal hypertension is due to intrahepatic (portal cirrhosis), or extrahepatic portal bed block. If the liver is the site of the portal block, i.e., portal cirrhosis is manifested by deficient liver function, splenectomy alone will not effect a cure. In this type of case it is necessary to perform a portocaval shunt in addition to the splenectomy. The nonsuture method of anastomosis between the portal and caval systems can be effected by the use of vitallium tubes. Even when the block is extrahepatic but proximal to the entrance of the

coronary vein into the portal system, splenectomy alone will not effect a cure. It is only in the case in which the obstruction is distal to the entrance of the coronary vein into the splenic vein that splenectomy alone will give a satisfactory result with relief of hematemesis, anemia, leucopenia, and thrombocytopenia.

One splenectomy was done for splenic neutropenia which resulted in marked improvement of the general condition of the patient.

Six splenectomies were performed for sickle-cell anemia, with poor results. The value of splenectomy in this condition is doubted by most authorities, because lymph nodes and other reticuloendothelial tissue may carry on the phagocytic function of the spleen even if it is conceded that the spleen is responsible for deterioration of the red blood cells.

One splenectomy was performed for torsion of the spleen. At operation the spleen was enlarged and twisted 3 times upon itself. Pathologically, the spleen showed thrombosis of the hilar vessels and massive splenic infarction. The patient made a remarkable recovery.

One splenectomy for aleucemic leucemia and 3 splenectomies for splenomegaly of undetermined etiology gave poor results.

On the basis of his study Tanna concluded that splenectomy is definitely indicated for congenital hemolytic anemia, idiopathic thrombocytopenic purpura, splenic neutropenia, and splenic torsion. Careful evaluation is in order before splenectomy is performed for Banti's disease. Splenectomy is of little or no value in patients with sickle cell anemia, aleucemic leucemia, and those with "splenomegaly of unknown origin." ROBERT TURELL, M.D.

MISCELLANEOUS

Sperling, L., Bosher, L. H., and Zimmerman, H.: Surgery of War Wounds of the Abdomen. *Surgery*, 1947, 21: 258.

In 100 consecutive cases of abdominal injury, 14 deaths occurred. Eleven deaths occurred among 74 cases of injury to multiple hollow viscera. This mortality rate is much lower than that of the first World War, and compares favorably with recent publications from World War II.

It is difficult to ascribe the lowering of the mortality rate to any one specific factor: penicillin, sulfadiazine, blood, plasma, and watchful postoperative treatment were all important factors. However, the proper treatment of shock was probably the most important single factor. Adequate decompression of the bowel by gastric suction siphonage, before, during, and after surgery, surely played an important role. SAMUEL KAHN, M.D.

GYNECOLOGY

UTERUS

Mazzullo, B.: Cancer of the Uterus at a Youthful Age. A Clinicostatistical Contribution (Il cancro dell'utero in età giovanile. Contributo clinicostatistico). *Ginecologia, Tor.*, 1946, 12: 33.

A clinical report of 4 cases of carcinoma of the uterus occurring in young women of less than 30 years of age is given. These cases were among a series of 109 cases of carcinoma of the uterus treated in the Obstetrical and Gynecological Clinic of the Maternity Hospital of Torino, during the 10 year period between 1933 and 1942, and made up 3.6 per cent of the total number of cases of uterine cancer.

In a preface before presenting the individual cases, the author discusses carcinoma of the uterus in general and stresses the fact that this disease is not a postmenopausal disease, but one that occurs most frequently in women from 30 to 35 years of age, during the period of greatest sexual activity.

Case 1 was that of a housewife of 29 years with negative family and past histories, who had borne 3 normal children. Three months prior to entry into the hospital, the patient developed a fetid leucorrhea streaked with blood, which increased in amount and was finally succeeded by severe vaginal hemorrhages. She had begun to experience low back pain. Physical examination revealed the presence of enlarged inguinal lymph glands. Vaginal examination revealed a bloody vaginal discharge, a large indurated ulceration of the whole anterior lip and one-third of the posterior lip of the cervix; the uterus was not enlarged but there was dense parametrial infiltration. Biopsy revealed a spinocellular type of carcinoma of the cervix. A diagnosis of inoperable cancer of the cervix was made. The patient was treated with radium and x-rays. She recovered satisfactorily and was discharged apparently free from her symptoms.

Case 2 was that of a housewife of 27 years with negative family and past histories, who had borne 2 children. During the second pregnancy a carcinoma of the cervix was found which had been causing symptoms for about a year. The patient was given radium therapy, the pregnancy proceeded to term, and a normal child was delivered. Soon after delivery, a blood streaked leucorrhea developed and on vaginal examination an extensive ulceration of the whole anterior lip of the cervix was discovered; the uterus was not enlarged and it was mobile in all directions. There was no apparent parametrial infiltration. Biopsy revealed a spinocellular carcinoma of the cervix. A vaginal hysterectomy was done, and 25 days later the patient was discharged from the hospital. For three years follow-up examinations revealed no sign of return of the disease.

Case 3 was that of a 28 year old housewife with negative family and past histories, who had borne a normal child. A second pregnancy was interrupted spontaneously and a curettage was performed. Two months later, the patient developed an abundant, blood streaked leucorrhea, especially abundant after sexual intercourse. Vaginal examination revealed a fetid serosanguinous cervical discharge; the cervix presented a characteristic irregular ulceration of the posterior lip of the cervix, of hard consistency and friable. The body of the uterus was not enlarged, but it was mobile in all directions. The parametrium was free. Biopsy revealed a spinocellular carcinoma of the cervix. A vaginal hysterectomy was performed and 20 days later the patient was discharged from the hospital. Nothing further was seen of the patient as she failed to report for postoperative follow-up.

Case 4 was that of a 29 year old housewife with negative family and past histories; she had borne 2 normal children. Two months before entry into the hospital, she developed a leucorrhea and had subsequently suffered vaginal hemorrhages, especially severe after sexual intercourse and douching. She had developed pain radiating from the pelvic region to the suprapubic, inguinal, and lumbosacral regions. Physical examination revealed a compensated mitral insufficiency. Vaginal examination revealed a cervix with extensive ulceration characteristic of neoplasm. The body of the uterus was fixed and the parametrium was infiltrated. Biopsy revealed a spinocellular carcinoma of the cervix. The patient was given radium and x-ray treatment, but she died 2 months after entry into the hospital of cardiac collapse.

These cases demonstrate that carcinoma of the uterine cervix affects young women at the height of their sexual activity. A family history of neoplastic tendencies is lacking. The patients have borne normal children. The initial sign of the disease is the development of a fetid, blood streaked leucorrhea (all 4 cases), which rapidly increases in severity and finally is replaced by vaginal hemorrhage. General trauma as from accidents and local trauma as from sexual intercourse and douching serves to increase the bloody discharge. Pain (cases 1 and 4) is a late sign and usually denotes extension of the disease to the uterine body, the parametrium, and to the regional and inguinal lymph nodes. Vaginal examination reveals the extensive ulceration of the cervix characteristic of neoplasm (all 4 cases). The uterus is mobile and not enlarged (cases 2 and 3) if there has been no extension of the disease into this organ and the parametrium. If such extension has taken place (cases 1 and 4), the uterus is fixed and the parametrium infiltrated. Biopsy reveals a carcinoma of the cervix of the spinocellular type (all 4 cases).

Treatment given by the author consists of vaginal hysterectomy (cases 2 and 3) if the examination shows no sign of extension of the disease from its original focus. The patient in case 2 in this series was well 3 years postoperatively. The patient in case 3 disappeared from the control of the author and

no postoperative report is available. In cases in which the disease has extended from its original focus (cases 1 and 4), as is shown by fixation of the uterus, parametrial infiltration, and enlargement of local and regional lymph nodes, x-ray and radium treatment is given. Case 1 of this series was treated apparently successfully with radium and x-rays. The patient in case 4, also with extension of disease into the body of the uterus and parametrium, died early after treatment from cardiac complications due to a long standing mitral insufficiency. Case 2 in which the patient was found to have carcinoma of the cervix during pregnancy, was treated with radium and a normal child was delivered at term. The treatment given did not eradicate the disease as the patient developed a fetid, blood streaked vaginal discharge shortly after delivery. She was then subjected to a vaginal hysterectomy. This leads the author to treat doubtful cases by complete hysterectomy (vaginal or abdominal) first and if signs of extension are present or suspected he resorts to x-ray and radium treatment.

Every young woman who develops a fetid blood streaked leucorrhea should be subjected to a careful and thorough physical examination, the gynecologist being mindful that this sign is the most important initial symptom of cancer of the cervix.

BLACKWELL MARKHAM, M.D.

Pollack, R. S., and Taylor, H. C., Jr.: Carcinoma of the Cervix during the First Two Decades of Life. *Am. J. Obst.*, 1947, 53: 135.

The apparent tendency of cancer to manifest itself during the earlier decades of life is a fact that bears emphasis. It should be evident that no age barrier exists excluding the development of adult lesions in young people.

The authors report the occurrence of cancer of the cervix in an 18 year old woman. The patient presented symptoms of vaginal bleeding at irregular intervals for a period of 2 years before being seen by the authors. During this time she had been seen by several physicians but had never had a pelvic examination. Various forms of endocrine therapy had been given. A biopsy was finally made, which revealed an adenocarcinoma of the cervix. Clinical examination placed the lesion in group 3. In spite of adequate radiological treatment she ran a slowly progressive downhill course.

Thirty cases of carcinoma of the cervix in women 20 years of age and younger are reviewed from the literature. The authors point out the fact that the diagnosis is too often delayed in these cases because of the patient's age. In spite of treatment the course was usually progressively downhill, and of this group only 4 patients have survived 5 years.

JOHN R. WOLFF, M.D.

Miller, N. F., and Henderson, C. W.: Corpus Carcinoma. *Am. J. Obst.*, 1946, 52: 894.

The authors present a review of 322 cases of corpus carcinoma which have come under their care since 1931; all patients have been traced. The plan of treatment was based on the assumptions that elimination of the primary neoplasm could best be achieved through complete surgical extirpation of the entire uterus, tubes, and ovaries, and that supplemental irradiation therapy should be most beneficial when given prior to operation, thereby causing widespread damage to cancer cells, minimizing manipulative spread at operation, and at least partially obliterating the lymphatics. In the planned treatment of choice, the decision to use deep x-ray therapy in preference to radium was based on its known effectiveness in neoplasia of the cervix, its helpfulness in prolonging the lives of some patients with ovarian carcinomas, and its broader field of irradiation which might also damage neoplastic cell masses sometimes found in the tubes and ovaries of patients with carcinoma of the uterus (7 times in 96 patients operated upon).

In the authors' experience, preoperative x-ray therapy proved to be a valuable adjuvant to total hysterectomy and bilateral salpingo-oophorectomy in the treatment of carcinoma of the uterus. Its use clears up uterine infection, reduces the size of the uterus, and decreases pelvic hyperemia, thereby facilitating operation. It has not in any discernible way interfered with wound healing. Because for most patients this is an outpatient procedure, the 3 weeks required for its administration is not a serious drawback.

The results obtained with preoperative x-ray treatment warrant its continued use, at least until some other combination, or new form, of therapy has proved to be more satisfactory. The use of very high voltage x-rays as a preoperative measure in carcinoma of the uterus appears promising and should be explored further. On the basis of available data, the relative merits of preoperative x-ray versus radium could not be stated. JOHN R. WOLFF, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Smith, F. G.: The Pathology and Physiology of Struma Ovarii. *Arch. Surg.*, 1946, 53: 603.

Thyroid tissue develops fairly frequently in ovarian dermoids, although it is usually no more than a microscopic portion of the tumor. There is, however, a rare type of ovarian tumor, known as struma ovarii, in which thyroid tissue is a major constituent. Some of these ovarian goiters are obvious teratomas containing, besides thyroid, such tissues as skin, teeth, brain and intestinal epithelium. Others consist entirely of thyroid or of thyroid in association with a cystoma. Gottschalk in 1899 described an ovarian tumor composed entirely of thyroidlike tissue.

It is the purpose of this paper to describe the pathologic changes and functional activity of thyroid tissue in ovarian tumors. The study is based on the investigation of a case of struma ovarii and an analysis of 152 previously published reports of cases.

Ovarian tumors containing thyroid tissue occur at all ages. Merttens reported the case of a 6 year old

girl, and Heinsen that of a woman of 74. Dermoids constitute the largest group of tumors which exhibit thyroid tissue. Seventy-six of the tabulated cases fall in this group. In 47 cases a serous or pseudomucinous cyst has been described in combination with a solid tumor consisting of thyroid tissue without other recognizable teratomatous elements. Thyroid tumors occurring alone, without cystoma andwithout other teratomatous elements (but not excepting bone or cartilage), are listed 26 times in the series. These are the cases of so-called pure struma ovarii. The smallest tumor of this sort was a 6 mm. nodule of thyroid tissue found by Masson and Mueller at autopsy of a 38 year old woman who had died of thyrotoxicosis and hepatic atrophy. Tumors the "size of a child's head" have been reported.

A tumor of the opposite ovary has been reported in 21 cases of struma ovarii. Thyroid tissue was present bilaterally in 6 cases.

Ascitic fluid was found in 26 cases, an incidence of 17 per cent.

Dissemination of these tumors has occurred in a few instances. Three distinct types of metastasis have been found: local implants on the peritoneum and omentum, regional spread with nodules in the liver, and distant metastasis.

Cervical goiter has been recorded 25 times in the entire series of 153 cases, an incidence of 16.3 per cent.

The tissue is identical with the structure of the thyroid gland. The colloid is homogeneous, tends to retract from the epithelium, and is frequently vacuolated. The staining qualities are those of colloid, not mucin or pseudomucin. The stroma is delicate, and interfollicular cells are numerous. There is evidence of various levels of physiologic activity. A histologic appearance of malignant growth has been described repeatedly. The borderline between physiologic and neoplastic processes is still vague. Graham considered invasion of the blood vessels the only reliable distinction between benign and malignant adenomas. Adenomatous proliferation with struma ovarii has been described.

Some of the otherwise pure thyroid, or cystoma with thyroid, tumors contained foci of calcification, or the formation of bone or cartilage. Since bone and cartilage may develop widely in the body, the authors exclude this as a special quality of teratomas.

Investigation of the iodine content of the thyroid tissue has been undertaken in 32 cases. In 15 cases the results were negative; qualitative tests were reported as giving positive results in 2 cases; 15 quantitative determinations have demonstrated iodine in varying amounts. The maximum values recorded are those of Emge (1.018 mgm. of iodine per gram of wet tissue), and of Masson and Mueller's first case (1.05 mgm. of iodine per gram of dry weight). These concentrations correspond to the iodine content of the normal adult thyroid gland.

Plaut's results indicate that in struma ovarii, as in the thyroid gland, the biologic activity parallels the iodine content.

Symptoms of thyrotoxicosis have been frequently cited as evidence of the physiologic activity of struma ovarii. Seven patients seem to have shown significant alleviation of symptoms following operation.

The origin of thyroid tissue in ovarian tumors has been explained in various ways. It has been denied that the tissue is true thyroid. Gottschalk considered the tumor a "folliculoma." In approximately half of the cases of struma ovarii, the tumors exhibit other tissues obviously foreign to the ovary. These tumors belong to the general class of teratomas. The ovarian tumors which contain only thyroid or thyroid with a cystoma are generally considered to be teratomas in which all other tissues have undergone regression.

A case is reported in detail and the literature is reviewed. There is a complete bibliography.

DANIEL G. MORTON, M.D.

Linard, R.: Metastatic Bilateral Carcinoma of the Ovary, or Krukenberg Tumor (Carcinomes métastatiques bilatéraux des ovaires ou tumeurs du Krukenberg). *J. chir.*, Par., 1946, 62:15.

This exhaustive study covers 165 cases of Krukenberg tumor which were published since 1927, including 6 of the author's own observation.

Although occurring at all ages, the tumor is most frequent in individuals between 30 and 40 years of age and comparatively rare in those past the menopause; therefore it seems that the functional activity of the ovary is a contributing factor to metastases into this organ.

The primary tumor could be ascertained in 139 of the 165 cases, either by operation or at autopsy. As to the clinical course, four different types of tumor can be differentiated. The first, found in about 50 per cent of the cases, present no gastrointestinal symptoms and their only sign is the increase of the abdominal volume, with or without amenorrhea. These cases are sometimes mistaken for pregnancy. In 3 instances, torsion of the pedicle with severe pain, ascites, and hyperpyrexia led to the operation. In the second group, including about a third of the cases, the gastrointestinal symptoms were observed first, and in the vast majority of the cases thestomach or the colon, especially the sigmoid, was the site of the primary tumor. Two cases of this group were caused by a tumor of the appendix complicated by phlegmonous appendicitis. Only months or years after the surgery of these tumors were signs of metastasis in the ovary observed (increase of abdominal volume, amenorrhea, and sometimes neuralgias of sciatic type). In the third group (15%), signs of a mass in the lower abdomen coincided with signs of gastrointestinal disturbances so that the correct diagnosis was possible prior to laparotomy.

The fourth clinical group showed signs of generalized carcinomatosis, and only on the postmortem table was the invasion of the ovaries found.

Pathologic anatomy. Although in the vast majority of the cases the site of the primary tumor was in the digestive tract, mostly in the stomach, other locations, especially the mammary gland and the

uterus, may also be accompanied by bilateral metastases in the ovary. Among the 139 cases, the primary tumor was found in the stomach in 95 cases, the small intestine in 2, the colon in 19, the appendix in 2, the pancreas in 3, the gall bladder in 2, the adrenal gland and the liver in 1 case each, the uterus in 5 cases, and the mammary gland in 9 instances.

Histologically, the Krukenberg tumor is characterized by pseudoglandular structures, isolated elements, especially signet ring cells, and mixed pictures which some authors consider as transition structures. It is, however, no longer justifiable to distinguish between "true" and "false" Krukenberg tumors by depending on the presence of signet ring cells. The signet ring appearance is caused by accumulation of mucus in the cell, which is characteristic of the carcinoma cell in general and may or may not occur in the ovarian metastases.

Very little is known of the pathogenesis. The question whether the Krukenberg tumor can occur as a primary tumor has for a long time been discussed in the literature. At present the consensus is that it is always a metastatic tumor, although some cases have been published in which either the malignancy of the ovary seemed to precede a carcinoma of the gastrointestinal tract, or in which a true Krukenberg tumor was found as the only malignancy on postmortem examination and no primary tumor could be detected in the digestive tract or any other organ.

Another much discussed problem is the way in which the tumor cells invade the ovaries and the reasons for the special affinity of these organs to invading tumor cells. Since the experiments done by Krause, and later by Polano and Amann, the implantation theory has had the greatest number of followers. These investigators injected diluted Chinese ink intraperitoneally in guinea pigs, mice, and dogs, and observed that the ink particles penetrated freely into the ovary.

The author criticizes this theory for various reasons. In the first place, the implantation theory would demand that, to be implanted in the ovary, the cancer cells reach and ulcerate the serosa at the site of the primary tumor. It has, however, been demonstrated that in many cases the primary tumor in the stomach did not even reach the muscularis, much less involve the peritoneum. One cannot possibly imagine how, in these cases, the tumor cells could have invaded the peritoneal cavity and reached the ovary in this way. Furthermore, exact histological investigations have never shown the presence of tumor cells at the surface of the ovary; rather, the tumor originates in most cases from the central parts of the organ. In view of these facts, the author rejects the implantation theory.

He believes that the old theory of retrograde lymphatic invasion explains best the observed facts, and is supported by many detailed investigations. It has been shown in a great number of cases that the first invasion of carcinomatous cells occurred in the central part near the hilus of the ovary. Here the lymph vessels were filled with tumor cells which infiltrated into the surrounding tissue. This was observed also in cases in which the organ appeared normal macroscopically. The hypothesis of retrograde lymphatic infiltration would also explain the metastases from breast carcinoma to the ovary, which cannot possibly be explained by the implantation theory.

Many hypotheses have been offered to explain the special predisposition of the ovary to develop metastases. Changes in the surface tension and in the *p*H may be contributory factors. Several men have observed that lowering of the surface tension stimulates and accelerates cell division. Extracts of malignant tumors have a lower surface tension than those of normal tissues. The same is true for the ovary and lymph nodes, whereas the spleen and the muscles which rarely are sites of metastases have a higher than average surface tension. As to the *p*H, it has been shown that the blood of carcinomatous patients has a more alkaline reaction than normal blood, and that cancer cells grow much faster in an alkalinized medium. On the other hand, the normal ovary and the lymph nodes have a slightly more alkaline reaction than the other tissues, so it is conceivable that the tumor cells which circulate in the lymph stream are more apt to invade the ovary than other organs.

The prognosis is poor. Of 40 cases on record in which the primary tumor as well as the Krukenberg tumor in the ovary was removed, only 3 patients survived for more than 3 years.

WERNER M. SOLMITZ, M.D.

Holm-Nielsen, P.: Injuries Caused by Hysterosalpingography. *Acta obst. gyn. scand.*, 1946, 26: 565.

The author reviews the recent literature as well as his experiences concerning the use of various iodized oils in roentgen visualization of the genital tract with particular reference to complications.

The most frequent complications are of an inflammatory nature, of which there are three main types: (1) recurrence of old adnexal inflammations, (2) primary adnexal inflammation following salpingography, and (3) diffuse peritonitis resulting from the examination.

Of these, the last 2 are of the most importance since they indicate infections produced by the examinations in previously normal individuals. In the patients in whom there is a flare-up of an old process there usually was noted a retention of the contrast medium in the tubes due to blocking of the distal ends. However, this does not mean that the inflammation is a result of irritation from the oil; more likely it is due to the manipulation associated with the examination. The absorption of oil from these tubes is very slow and evidence of its presence may be demonstrated for years. Also, if the examination is carried out near the time of a menstrual period a flare-up may occur, as ordinarily recurrences take place during or near such a period.

However, the incidence of inflammatory complications is difficult to ascertain; in two series of 3,000

and 8,000 cases it was 0.43 and 0.34 per cent, respectively.

In addition to inflammation, mechanical injuries may likewise follow hysterosalpingography, the most common being perforation of the posterior cervical wall, rupture of a closed tube, and injection of oil into the uterine veins. Still another potential complication is the occurrence of tubal pregnancy in abnormal tubes which have become patent following the oil injection.

Replies to 112 questionnaires sent throughout Denmark by the author indicate that hysterosalpingography is used in all obstetrical and gynecological departments, in more than three-fourths of the surgical departments, and in more than one-half of the smaller hospitals. The estimated number of examinations carried out in these hospitals was 12,000, and the inflammatory complications amounted to 0.25 per cent with 2 deaths.

In the author's hospital, in a 4½ year period, 1,098 such examinations were made. Many patients were treated as out-patients and no attention was paid to the relationship of the examination to the menstrual cycle. Certain precautions, however, were taken; the temperature and sedimentation rates had to be normal and cervical smears were examined for gonococci. The criteria used to indicate inflammatory reaction following examination were:

1. Pain which persisted for at least 24 hours and was accompanied by tenderness and an elevated temperature or sedimentation rate.
2. Elevated temperature—if the temperature had been normal and there was no other reason for its elevation, and, particularly, if the elevation was accompanied by pain and an elevated sedimentation rate.
3. Tenderness above the inguinal ligaments, particularly if associated with rigidity.

Of the 1,098 cases, 29 showed signs of inflammation; in 28 of these there were blocked tubes. The signs were classified as follows:

1. Mild
   a. Temperature elevation only (11 cases)
   b. Pain and tenderness without temperature elevation (4 cases)
   c. Temperature elevation for from 1 to 10 days with moderate pain and tenderness (7 cases)
2. Markedly elevated sedimentation rate, and, on examination, tender induration in one or both adnexal regions (7 cases)

There were no cases of acute peritonitis and no deaths.

Fifteen patients were operated upon at different intervals after the examination. In 14 there were peritoneal changes which consisted of gray thickening and on microscopic examination were found to be characteristic of granulomas. One cervix was perforated. In 5 cases the uterine veins were injected.

The author concludes that this procedure should not be considered a harmless examination, but its diagnostic value is so great that it should not be discarded. J. Robert Willson, M.D.

Reis, R. A.: On the Origin of Certain Perisalpingeal Cysts. *Am. J. Obst.*, 1946, 52: 964.

Small cysts of varying size are often found in the wall of the uterine tubes. The derivation of these cysts has received much attention, and there are many hypotheses to explain their origin. The purpose of the present communication is to draw attention to certain cell balls containing cystic structures, to discuss the possible origin of these structures, and to offer them as an additional starting point of pelvic adenocarcinoma.

The cell balls consist of transitional cells which resemble, morphologically, those described by Limbeck and Brunn in the urinary tract. The cells in the center of these balls often become liquefied and form cysts.

The cells forming the inner walls of these cystic degenerated areas assume a cuboidal shape. The origin of adenocarcinomas in the urinary bladder is traced back to these cystic, degenerated cell balls. Changes similar to those occurring within the cell balls in the urinary tract have been observed in the cell balls located in the wall of the tubes, including the change into cuboidal cells.

Because of the resemblance of these cell balls to those described by Limbeck and Brunn, and the close resemblance of the individual cells of these nests to the transitional cells lining the urinary tract, and the similarity in morphologic alteration of the cells lining the cystic degenerated areas, it is suggested that the cell balls and cysts seen so often in the walls of the tubes may arise from misplaced lower urinary tract epithelium.

A primary papillary transitional cell carcinoma of the uterine tube is recorded. This probably took its origin from such epithelial cell balls. A second carcinoma involving both the tube and the ovary is described. This tumor consisted of both transitional epithelial features and glandular structures. It is possible that this tumor may also have arisen from such cell balls of the tubal wall. John R. Wolff, M.D.

Scheffey, L. C., Lang, W. R., and Nugent, F. B.: Clinical and Pathologic Aspects of Primary Sarcoma of the Uterine Tube. *Am. J. Obst.*, 1946, 52: 904.

The author records an unusual pathological entity, reviews the literature with respect to it, and discusses the symptomatology, physical findings, and the difficulties encountered in arriving at an accurate preoperative diagnosis.

The symptomatology is not distinctive, but is akin to that of tubal carcinoma or ovarian carcinoma in some forms. Tubal malignancy is more likely to occur in the late reproductive menopausal or postmenopausal periods. Vaginal bleeding is not nearly so well marked as it is in uterine carcinoma; the discharge is usually watery and blood-tinged. Pain is probably the most constant and conspicuous symptom, and is often associated with gastrointestinal annoyance. Of the physical signs, an adnexal mass is usually all that can be found in the early stages.

Later, abdominal distension, ascites, and an extensive pelvic mass are found, accompanied by emaciation and cachexia. If a tubal lesion is thought of or suspected in an obese individual, examination under anesthesia, with preparation for immediate abdominal operation if a definite adnexal mass is found, is the procedure of choice.

The procedure should be complete abdominal hysterectomy with bilateral salpingo-oophorectomy rather that simple removal of the affected tube and/or ovary. Postoperative irradiation is indicated when operation has been, of necessity, incomplete and the diagnosis of malignancy has been made in the laboratory, or when metastases are observed. The question of irradiation therapy when operation has been complete, and when no metastases are visible, is debatable.

The prognosis of tubal sarcoma, as well as of tubal carcinoma, is doubtful at best. Curability can be enhanced only by early diagnosis and prompt treatment. The latter, in the final analysis, can be made possible only by a keen appreciation of the symptoms and findings, but more probably by the periodic pelvic examination of women through continued lay and professional education. JOHN R. WOLFF, M.D.

MISCELLANEOUS

Meigs, J. V., and Ingersoll, F. M.: Thrombophlebitis and Phlebothrombosis in Gynecologic Patients: The Prophylaxis, Recognition, and Treatment. *Am. J. Obst.*, 1946, 52: 938.

Because of the seriousness of embolism in cases of thrombophlebitis, a means was sought to prevent fatalities from this cause in postoperative patients. In the autopsy room, it was definitely shown that nearly all fatal emboli come from the veins of the legs. The general plan of surgeons, urologists, and gynecologists of the Massachusetts General Hospital, Boston, is to try to prevent pulmonary embolism, whenever possible, by ligating the proper veins in patients who have a suggestion of thrombophlebitis or phlebothrombosis, and to interrupt definitely the femoral veins of those patients who have had a sublethal pulmonary embolus or infarct.

Diagnostic signs and symptoms indicating involvement of the leg veins and concomitant changes in pulse, temperature, and respiration, suggestive of a small, unrecognized pulmonary infarct are presented. Various methods used in the attempt to prevent the formation of phlebitis or thrombosis in the legs of postoperative patients are discussed by the authors.

The details of surgical treatment are given, the authors maintaining that both legs must be operated upon. Prophylactic interruption of veins is favored, particularly in patients 60 years of age or older, in which group most fatal emboli occur, and especially in patients who have had phlebitis or an embolus following a previous operation.

There was no immediate mortality among 1,057 patients with vein interruption, 75 of whom were gynecologic patients, and, except for an occasional lymphorrhea from the wound, no serious complications have occurred.

Surgeons of the Massachusetts General Hospital are all convinced that interruption of the femoral veins is essential after a sublethal embolus or infarct. Nearly all are agreed that interruption of the femoral veins is essential after the diagnosis of thrombophlebitis and phlebothrombosis has been definitely made. JOHN R. WOLFF, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Ritala, A. M.: Inorganic Elements in the Placenta. New Nutritive Salt for Prenatal Care. *Acta obst. gyn. scand.*, 1946, 26: Supp. 5.

The placentas investigated were from the Obstetric Department of the Central Hospital at Turku. The material has been collected in the course of 6 months, from March to August, 1944. In addition to the placentas from normal parturitions, which were necessary for a reliable comparison, placentas from pathologic cases were studied, especially those in toxemia cases. The methods of study are detailed. Tests for all inorganic elements were made.

The following quantities of inorganic elements were found:

Inorganic elements in the placenta (15 placentas)	Per cent in ash Mean	
Phosphorus	10.3	±0.6
Calcium	6.3	±2.2
Iron	1.1	±0.1
Magnesium	0.89	±0.10
Copper		
Zinc	0.12	±0.03
Aluminum	0.13	±0.03
Manganese	0.013	±0.005

Rubidium was found in all samples in traces, as were silicon, tin, lead, and chromium. Arsenic, cobalt, nickel, or barium, on the other hand, were not found.

In cases of pregnancy toxemias, with albumin in the urine, the amounts of calcium and magnesium in the placentas were smaller than in normal cases. Phosphorus, iron, copper, zinc, aluminum, and manganese in the placentas in toxemia cases remained within the limits of normal.

The ash from placentas in early pregnancy was analyzed and showed a relative abundance of magnesium (0.85%), zinc (0.2%) and manganese (0.06%). Phosphorus (6.7), calcium (1.6), iron (0.2), rubidium (0.25), and aluminum (0.09), on the other hand, occurred only in small amounts in placentas from the early months of pregnancy.

With a diet deficient in calcium, if no medicaments were given, the amounts of calcium, phosphorus, and magnesium occurring in the placentas were smaller. Iron, rubidium, and zinc, on the other hand, had been stored in their stead as antagonists.

In the placentas of women who had been on a calcium diet, both calcium and phosphorus had been stored in amounts exceeding the normal; the percentages of calcium and phosphorus in ash were about 2.5 higher on an average. Other elements occurred in smaller quantities. The amounts of iron, calcium, and phosphorus in the placentas of anemic women were under normal.

The author then discusses the theoretical role of many of the inorganic elements as they might be related to pregnancy and the toxemias of pregnancy. He indicates his belief that a combination of the elements investigated is most important for the maintenance of normal pregnancy, and that such a combination is not obtained in the diet of the average gravida. On the basis of these assumptions he has concocted a "nutritive salt" for use in prenatal care. Its composition for the first period of pregnancy should be as follows:

Dicalcium phosphate	4.86	gm.
Iron lactate	1.05	gm.
Magnesium sulfate	0.28	gm.
Copper sulfate	0.01	gm.
Zinc chloride	0.002	gm.
Aluminum subacetate	0.002	gm.
Manganese glycerinophosphate	0.0035	gm.
Potassium iodide	0.00013	gm.
	6.20763	gm.

For the period approaching term about twice the amount of dicalcium phosphate and three times the quantity of magnesium are recommended.

DANIEL G. MORTON, M.D.

King, E. L., and Davenport, J. W., Jr.: Some Clinical Aspects of the Rh Factor in Obstetrics. *Am. J. Obst.*, 1946, 52: 917.

Although the discovery of the Rh factor is a recent one, having been detected first in 1940, a voluminous literature has developed because of the importance of this factor, both scientifically and clinically. The authors confine themselves to a consideration of the clinical implications of the Rh factor, after a brief review of fundamental principles, and a presentation of their series of 122 cases, with special consideration of 12 additional cases.

Clinically, tests for the Rh factor should be done on all pregnant women as soon as facilities, trained workers, and proper sera are available. In Rh negative women, the husbands should be tested also. If the husband is negative, the fetus is bound to be negative, and the newborn infant will not have hemolytic disease. In Rh negative women with Rh positive husbands, tests for Rh antibodies should be performed. This is imperative in multigravidas, and in primigravidas with a history of previous transfusion. If none is found on repeated tests, the prognosis for the fetus is good.

If antibodies are found, the titer should be determined at frequent intervals during the pregnancy. If there is a rise in titer as the pregnancy progresses, induction of labor or cesarean section at 7½ or 8 months might enhance the baby's chances. This question is still in doubt. After delivery, the erythro-

blastotic infant should be transfused at once (the veins of the umbilical cord can be used) with Rh-negative blood, and this should be repeated as often as is indicated.

The chance of securing a healthy child in subsequent pregnancies, when one or more erythroblastotic infants have been delivered, is not good unless the husband is proved to be heterozygous, in which case it is about 50 per cent. If the husband is homozygous, the next pregnancy should not occur until several years have elapsed, after repeated negative tests for antibodies. Even then the risk is great, as the reticuloendothelial system probably retains the sensitization for life.

It is imperative that all Rh-negative females (of whatever age) requiring transfusions receive only compatible Rh negative blood.

JOHN R. WOLFF, M.D.

Bracale, U.: Bone Marrow Biopsy in Eclampsia Gravidarum (La mielobiopsia nell' eclampsia gravidica). *Arch. ostet. gin.*, 1946, 51: 245.

In a study of 21 cases of women affected with eclampsia in which sternal punctures were done, the authors found a disturbance in the hemopoietic function, principally in the erythroblastic maturation phase, in which there was a hyperfunction of the granuloblasts.

Peripherally, the blood presented a hypochromic anemia, moderate leucopenia with neutrophilia, a relative lymphopenia, but no eosinophilia.

The sternal marrow showed an increase in the parenchymal stromal elements, and an increase in the hemoblastic components.

The erythropoiesis was generally normopoietic, and at times the cells were macroblastic, or anisocytotic with microcytosis and macrocytosis. There was also untimely nuclear pyknosis.

Granuloerythroblastosis generally demonstrated a prevalence of the white series. In the granuloblastic series, there was very frequently the phenomenon of nucleocytoplasmic degenerative changes. In 3 cases the curve of erythropoietic maturation demonstrated a shift to the left with inhibition of the various mature phases, while the weight of the curve in the white series showed an increase in the myelocytic components. Proliferation of the hyperplastic cells exceeded the process of maturation, or else the relative diminution of the metamyelocytes resulted in rapid liberation of the mature elements in the toxic condition, while the toxic state hindered the hemopoietic activity of the marrow.

ARTHUR F. CIPOLLA, M.D.

Micale, G.: The Nephropathology of Pregnant Women with Malaria (Le nefropatie delle gravide malariche). *Riv. ital. gin.*, 1946, 29: 3.

In a report of 11 cases of pregnancy concomitant with a malarial infection, the author states that kidney lesions of malaria were of greater frequency in pregnancy. The nephropathology of pregnancy in malarial subjects is dependent on the toxic state of the pregnancy, while the nephropathology of malaria in pregnancy is dependent on the severity of the paludal infection.

Various pathological changes were found in the kidney, which was larger than normal. The surface was smooth, and the capsule stripped easily. On section, the cortex had a yellowish color, and could be differentiated from the medulla. Microscopically, the majority of the renal corpuscles were normal, a few were enlarged, and others presented granular casts. Degenerative changes with necrosis of a serious nature were seen in the tubules, while in some, casts blocked the entire lumen. In the cortex there were circumscribed necrotic lesions. Even in the grave cases there was an infiltration of pigments in the tubules and the presence of melanophore leucocytes within Bowman's capsule. The quantity of pigment was less and the number of organisms was smaller in the kidney than in other organs, even though the kidney dominated the picture.

The tertian type of malaria was found to be the most malignant. ARTHUR F. CIPOLLA, M.D.

Avilés, V. M.: Experiences with Cardiopathies in Pregnancy (Nuestra experiencia sobre cardiopatías en el embarazo). *Obst. gin. lat.-amer.*, 1946, 4: 571.

Avilés reviews 52,458 clinical case histories obtained from the San Borgia Maternity Hospital. Of these, 472 showed some form of cardiopathy in association with the pregnancy. There were 49 patients with cardiac insufficiency, and 5 of these died.

Of the patients having valvular heart disease, 88 had mitral insufficiencies (57 of which resulted from rheumatic fever); 60 were so-called "mitrals," and 8 had mitral stenoses, 10 mitroaortic stenoses, 5 aortic insufficiency, and 1 mitrotricuspid stenosis. Besides the cardiac disorder, there was chronic nephritis in 5 patients, lues in 2, and hepatomegaly in 2. These diseases were probably responsible for the heart condition.

The author reviews the disposition of each group of cases, the management of patients with heart disease, the effects of pregnancy upon such patients, and the outcome of pregnancy in patients with heart disease. STEPHEN A. ZIEMAN, M.D.

Garcés, E.: Missed Abortion. ("Missed Abortion.") *Bol. Soc. chilena obst. gin.*, 1945, 10: 371.

Garcés recounts his experiences with 130 cases of missed abortion seen at St. Francis Borgia Maternity Hospital from 1938 to 1945. These accounted for 1.4 per cent of the spontaneous abortions. He considers a missed abortion as one in which a dead fetus is retained in the uterus for a minimum of 2 weeks. It is difficult to diagnose this condition, and x-ray studies, Friedman tests, pregnandiol urinary excretion determinations, and fetal electrocardiograms may be required.

It is believed that syphilis, nephritis, and endometritis are the 3 principal conditions which bring about missed abortion. Mumification occurs in 60 per cent of the cases and dissolution in 23 per cent.

The author believes in operative intervention when the diagnosis of missed abortion is established, supporting his belief on biologic, physiologic, and economic-social grounds. Manual and artificial dilatation is practiced after several days of estrogen therapy in order to counteract hemorrhage and favor uterine muscular contractions.

STEPHEN A. ZIEMAN, M.D.

LABOR AND ITS COMPLICATIONS

D'Ernst, J.-P.: The Test of Labor. Its Application at the Obstetrical Hospital in Geneva (L'épreuve du travail. Son application à la Clinique Obstétricale de Genève.) *Bruxelles med.*, 1946, 26: 1547.

In many cases of dystocia due to contracted pelvis or other factors, the test of labor is the only method by which the obstetrician can decide whether engagement of the head and normal delivery are possible. Walthard and Frey of the Zurich Maternity Hospital improved on the old method by counting and registering the number of labor pains during the first and second stages. From their experiences in a series of 5,000 deliveries they concluded that the number of pains is very constant for each stage in normal deliveries. By counting the contractions and, at the same time, observing the progress of descent and dilatation of the cervix, it is possible at an early stage to decide whether normal delivery is possible or cesarean section is indicated. However, this method is not altogether certain. Other factors beside contracted pelvis may retard the engagement of the head and induce the obstetrician to perform an unnecessary and unjustified cesarean section. The most frequent among these factors are spasticity of the cervix and delayed rupture of the membranes.

Not infrequently, spasticity of the cervix is the cause for nonengagement of the head also in cases in which the pelvis is completely normal. Clinically, this condition is characterized by extremely painful labor pains; the contractions of the uterus are irregular in rhythm and sometimes accompanied by insufficient relaxation of the uterus between the pains. Dilatation and effacement remain stationary, and on rectal or vaginal examination, the cervix appears preserved, rigid, and thick. At an advanced stage, labor comes to a complete stop and the contractions of the uterus become more and more painful. This picture of "cervical dystocia" often subjects the patient to various unnecessary and dangerous obstetrical interventions. The treatment of choice in these conditions is the application of spasmolytics (spasmalgin) which, if properly done, nearly always accomplishes complete effacement and dilatation. After correction of the spasticity, the fetal head, which often remains floating at the superior strait for many hours, enters the small pelvis in a very short time.

In another group of cases, persistence of the bag of waters is the factor which prevents engagement of the head and delays the delivery for many hours. It is the routine of the Maternity Hospital in Geneva to rupture the membranes at a very early stage of dilatation (3 or 4 cm.) in all cases of delayed engagement of the head. Very often the spasm and the edema of the cervix clear up and rapid dilatation follows a short time after the rupture. On the basis of 15,000 deliveries, the author believes that the widespread apprehension in premature rupture of the membranes is not justified. If vaginal examinations are avoided and the rules of aseptic management are observed, the incidence of infection is not higher in premature rupture, be it spontaneous or induced, than in other cases.

The main use of the test of labor is made in borderline cases of contracted pelvis. It is generally agreed upon that external and internal pelvimetry give only a very approximate idea of the real shape of the pelvis, and that many errors are possible, even with the help of roentgen examination. Especially in cases with a true conjugate around 8.5 cm. it can often not be decided without a test of labor whether normal delivery is possible. In these cases, the counting of the pains, as described, is a valuable help. If after 100 pains following the rupture of the membranes, engagement and dilatation have made no progress, a definite disproportion is present, and low cesarean section is indicated. Of course, this rule does not apply to breech presentations.

The question whether cesarean section should be done many hours after the membranes have ruptured has been discussed widely in the literature. The 100 labor pains which, according to the Swiss School, are required for a conclusive test of labor, take from 8 to 10 hours. The Geneva hospital does not hesitate to do a cesarean section after this time, even in cases in which signs of beginning infection are present.

Although the author stresses the great importance of the test of labor, it seems that it is not done very frequently at the Geneva hospital. In a series of 13,355 deliveries, it was performed in only 166 cases (140 primiparas, 26 multiparas). The indication was not always a contracted pelvis; in a fairly large number of cases other anomalies delayed engagement of the head, such as cervical dystocia, dystocia of the soft parts, and malpresentations. In 52 per cent of the cases the test was negative, i.e., normal delivery was possible. In the positive cases, cesarean section was done in 67, high forceps in 4, and cranioclasty, perforation, and podalic version in 1 case each.

WERNER M. SOLMITZ, M.D

Volpitto, P. P.: Amnesia during Parturition. *J. Am. M. Ass.*, 1946, 132: 1059.

The author describes a technique for producing amnesia during labor, which combines the use of pentobarbital and scopolamine administered intravenously. The intravenous route is more satisfactory due to the delay in absorption of medication from the gastrointestinal tract during labor. The technique is as follows: 0.25 gm. of sodium pentobarbital and 0.0006 gm. of scopolamine hydrobromide are mixed and diluted to 10 c.c., with sterile distilled water;

thus each cubic centimeter of the mixture contains 0.025 gm. of pentobarbital and 0.00006 gm. of scopolamine. When the patient begins to have regular pains at 4 to 5 minute intervals, which last for 30 or more seconds, the material is injected intravenously. An initial 3 to 4 c.c. are given at a rate of 1 c.c. every 5 to 10 seconds; then it is slowed to 1 c.c. every 30 seconds until the patient falls asleep or talks incoherently. The average initial dose was 10 c.c. and the dosage varied from 6 to 20 c.c. Subsequent injections of about 2 c.c. are given when the patient becomes restless during contractions, does not sleep, or becomes lucid between contractions.

Analysis of the results in 170 patients indicate that 89.4 per cent had complete amnesia while 10.6 per cent had partial amnesia. In 10.6 per cent of the patients there was some retardation of labor, and in 2.9 per cent the contractions ceased completely. Three patients became unmanageable and required morphine in addition to the pentobarbital-scopolamine mixture. A severe fall in blood pressure occurred twice, and severe respiratory depression was noted once. One maternal death, associated with cyanosis, dyspnea, a fall in blood pressure, and a rise in pulse rate, occurred. Ninety-two and four-tenths per cent of the infants breathed spontaneously; 7.6 per cent required resuscitation and, of these, 1 died.

The author believes that this is an efficient and safe method for obtaining satisfactory amnesia during labor. J. ROBERT WILLSON, M.D.

Belvederi, C.: Clinicostatistical Data and Observations on Podalic Birth in the Obstetrical and Gynecological Clinic of Bologna. (Dati e rilievi clinico-statistici sul parto podalico nella Clinica Ostetrica e Ginecologica di Bologna). *Riv. ital. gin.*, 1945, 28: 150.

The author reports on the podalic births occurring in the Maternity Clinic of the Obstetrical and Gynecological Hospital at Bologna for the 10 year period from January 1, 1935 to December 31, 1944. Seven hundred and forty-seven podalic births occurred among a total of 19,125 births during this period. Of the 747 infants 355 (47.52%) were males, while 392 (52.48%) were females.

Of the mothers, 283 (38.71%) were primiparas under 30 years of age, 102 (13.95%) were primiparas over 30 years of age, and 346 (47.33%) were multiparas.

In 632 cases the births were single births. In 99 cases, they were twin births. Among the twin births 32 (32.32%) of the mothers were primiparas and 67 (67.67%) were multiparas.

In 67 cases (67.67%) the fetuses were born, one in cephalic presentation and one in podalic presentation, and the fetus in the podalic presentation was born first in 24 of these cases (35.82%).

In 16 cases (16.16%) both fetuses were born in podalic presentation and in 16 cases (16.16%) one fetus was in podalic presentation and the other in shoulder presentation, and the fetus in podalic presentation was born first in 13 of these cases (81.25%). Whenever the fetuses were in longitudinal position (cephalic-podalic presentation) the fetus in the cephalic position was most often born first. When the 2 fetuses were in the podalic presentation and shoulder presentation, respectively, the fetus in podalic presentation was most often born first.

The course of pregnancy was perfectly normal in 578 (79.06%) of the mothers, while in the remaining mothers (153) it was complicated by some morbid condition. The morbid conditions complicating pregnancy were: (1) conditions occurring in the mother independent of the pregnant state, (2) morbid conditions depending on the pregnant state, (3) anomalies manifest during the course of labor, and (4) anomalies of the fetus which caused difficulty at the time of labor. Of the diseases affecting the general condition of the mother, the most important were pulmonary tuberculosis (6 cases), the various cardiopathies (13 cases), diabetes mellitus (1 case), and lues (10 cases). Among the conditions resulting from the pregnant state, there were the various nephropathies (48 cases), eclampsia (8 cases), and cystopyelonephritis (8 cases). Among the anomalies verified at the time of labor, there were prolapse of the cord (19 cases) and placenta previa (8 cases). Among the complications caused by abnormalities of the mother, there were contracted pelvis (30 cases), fibroma of the uterus (3 cases), deformity of the uterus (1 case), and polyhydramnios (3 cases).

Of the women with pulmonary tuberculosis (3 primiparas and 3 multiparas), 3 were delivered by podalic version, the method of Krause, and 2 were delivered spontaneously; in the last the pregnancy was interrupted at the seventh month by the method of Krause.

Of the women with cardiopathy (5 primiparas and 8 multiparas), 4 were delivered spontaneously and 5 by podalic version; in the remainder (4) the pregnancy was interrupted by the method of Krause.

Of the 8 women with eclampsia (7 primiparas and 1 multipara), 3 were delivered by cesarean section, 2 by podalic version, and in 2 the pregnancy was interrupted by the method of Krause. Two of the women with eclampsia died immediately after delivery, while a third one died on the fourth day of the puerperium.

Of the women with prolapse of the umbilical cord (4 primiparas and 15 multiparas), 17 were delivered by podalic version and 2 were delivered spontaneously.

Of the 4 women with central placenta previa and 4 with marginal placenta previa, 2 were primiparas and 6 were multiparas. Two were delivered spontaneously, 5 by podalic version, and 1 was delivered by cesarean section.

Of the 30 women with contracted pelvis, 10 were delivered spontaneously, 11 by podalic version, 8 by cesarean section, and 1 was delivered by craniotomy.

Presentation. Of the 747 fetuses in podalic presentation, 117 were born in complete podalic presentation and 601 in incomplete podalic presentation; in

29 cases it was not possible to determine accurately the variety of the presentation.

In this series of cases from the Obstetrical Clinic of Bologna, only 267 women were delivered by podalic version. Of these 267, 17 (6.36%) were delivered because of prolapse of the cord, 5 (1.87%) for placenta previa, and 18 (6.74%) on account of the condition of the mother (pulmonary tuberculosis, 3 cases; eclampsia, 3 cases; grave nephropathies, 7 cases; and cardiopathies, 5 cases). The other 227 women (85.01%) were delivered following general indications such as inertia of the uterus and diminishing vitality of the fetus.

Intervention by podalic version was done most often in case of primiparas.

Excessive weight of the fetus also gave rise to complications which demanded intervention by podalic version.

Monolateral episiotomy was done prior to podalic version in 38 cases.

Vaginoperineal laceration occurred in 114 cases (15.59%) of all podalic presentations. Sixty-one women were delivered by operative delivery while 53 were delivered spontaneously. These lacerations occurred in 61 young primiparas (21.55%); in 21 older primiparas (30.58%), and in 32 multiparas (9.25%). Ninety-four (82.45%) of the vaginoperineal lacerations were of the first or second degree, while 20 (17.55%) were of the third degree. Particular care should be exercised to avoid the production of perineal lacerations during podalic versions, especially in the cases of primiparas.

Weight of the fetus. Of 109 fetuses weighing less than 2,000 gm., only 19 (17.43%) were delivered by podalic version; of 110 fetuses weighing from 2,000 to 2,500 gm., 33 (30.00%) were delivered by podalic version; of 187 fetuses weighing between 2,500 and 3,000 gm., 64 (34.22%) were delivered by podalic version; of 208 fetuses weighing between 3,000 and 3,500 gm., 85 (40.86%) were delivered by podalic version; and of 100 weighing between 3,500 and 4,000 gm., 19 were delivered by podalic version. Of 33 fetuses weighing more than 4,000 gm., 19 were delivered by podalic version. This affirms the author's opinion that intervention is necessary in direct proportion to the increase in weight of the fetus. The heavier the fetus, the more resistance it offers as it passes through the birth canal with the result that labor is prolonged, inertia of the uterus occurs, and vitality of the fetus diminishes. Intervention becomes necessary.

Maternal morbidity. In 75 (10.25%) of all the cases of podalic presentation, pregnancy did not proceed normally. In 35 cases the mother was febrile and in 45 the mother ran a subnormal temperature. Prolonged labor and premature rupture of the membranes favored the occurrence of puerperal infection.

Maternal mortality. In the 731 cases of podalic presentation the maternal mortality was reported as 0.82 per cent. Of the 6 mothers who died, 3 died from eclampsia and 3 died from puerperal infection. Of the mothers with eclampsia, a young primipara with twins, in whom the pregnancy was interrupted in the ninth month, died without regaining consciousness 2 hours after manual podalic version. The second one died during the first day after delivery following a cesarean section in the eighth month of pregnancy. The third died on the fourth day of the puerperium.

Of the mothers dying from puerperal sepsis, one was a primipara who gave birth to a 4,200 gm. fetus following manual podalic version with previous episiotomy. She died the twenty-third day of the puerperium. The second one, a secundipara, died on the ninth day of the puerperium after spontaneous delivery. The third, a multipara, died the tenth day of the puerperium after spontaneous delivery.

Fetal morbidity. Fetal morbidity resulted from more or less grave traumatic lesions produced by labor or in the course of necessary manipulation in the extraction of the fetus. Among the 747 fetuses, there was 1 case of obstetrical paralysis of the right arm, 2 fractures of the left shoulder, and 1 fracture of the left clavicle. Of these 4, 3 were born by manual podalic version and 1 was born spontaneously. There were 14 fetuses with congenital deformities.

Fetal mortality. One hundred and sixty-three (21.82%) of the fetuses died. Forty-six were dead before delivery; 42 died during delivery, and 75 died between the first and seventh days after delivery. The causes of this high percentage of fetal mortality were: (1) long duration of labor, (2) precocious rupture of the membranes, (3) prolapse of the cord, (4) asphyxia following pressure on the umbilical cord from the fetal head or the maternal pelvis, (5) premature respiratory movements of the fetus, (6) all complications which retarded by obstructing the expulsion of the head or its extraction, and (7) inefficient uterine contraction which prolonged labor. Excluding the fetuses which were dead before labor started, the greater number of those dying during labor had developed in older primiparas, while those dying during the puerperium developed in young primiparas and multiparas.

The frequency of podalic births in the author's series agrees with that reported by other institutions in other localities.

It is impossible to establish an etiological criterion of podalic presentations from data coming from the Clinic at Bologna. Certain organic conditions in the mother, ovary, and fetus favor the production of this type of presentation.

When the author is aware of the fact that the fetus is in podalic presentation, he awaits spontaneous delivery of the fetal trunk and then assists in the delivery of the fetal head, unless the condition of the mother or fetus demands immediate intervention by operative methods.

The fetal mortality in podalic births is high and results primarily from asphyxia due to compression of the umbilical cord by the fetal head or the maternal pelvis. Such pressure should be allowed only for a short time before operative methods are employed in an attempt to prevent fetal death.

BLACKWELL MARKHAM, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Trillat, P., and Notter, A.: Gangrene of the Extremities Due to Arteritis during Pregnancy (Gangrène des membres par artérite au cours de la puerpéralité). *Presse méd.*, 1946, 54: 640.

Gangrene of the extremities due to arteritis alone is rare during pregnancy. In a review of the French and English literature only 24 proved cases were collected by the authors. The arteritis may occur during a pregnancy, or may follow an abortion or a normal delivery. Twenty-nine cases of gangrene reported in the literature can be considered as being due to venous thrombosis while others are of mixed etiology, arterial and venous.

The authors add 3 cases of their own. One was a case of gangrene of the upper extremities and the right lower extremity secondary to a fulminating arteritis occurring the eighth day following an abortion. Death ensued 12 hours after the onset of the complication. The second observation was a case of dry gangrene of both feet occurring in a 36 year old woman, a para-iii, which was due to acute arteritis that developed on the twelfth day following a difficult delivery complicated by infection. Bilateral femoral sympathectomy and unilateral arteriectomy of the anterior tibial artery were performed with some improvement for a month. Bilateral amputation of both feet was performed 2 months after the onset of complications. The patient was discharged as cured. The third observation was a case of acute arteritis of the right leg occurring in a multiparous woman 33 years old. The patient was 2½ months pregnant with associated cardiac disease. She was cured by sympathectomy.

The authors discuss the etiology and pathogenesis of arteritis. First, they discarded all cases of gangrene of external origin secondary to heat or cold or caustic substances and, also, cases of diabetic gangrene of both feet secondary to postabortum infectious arteritis.

As far as the etiology of arteritis is concerned, the infectious factors are foremost. In some instances, there is no relation whatsoever between the organisms and the puerperium. One is then dealing with arteritis of infectious diseases occurring in a postpartum patient. In the great majority of cases the organism is present in the genital tract and it is worthy of mention that the organism is rarely localized in the arteries. In 4 cases, blood cultures and smears taken from the arterial wall were positive for the Streptococcus. The Staphylococcus and colon bacillus have been found also. Pregnancy is undoubtedly a predisposing factor for the development of infection, especially if the delivery has been unusually difficult or associated with hemorrhage and obstetrical traumas due to forceps, version, or embryotomy.

Criminal abortion may be a factor of paramount importance, also the excessive use of ergot and its derivatives has been incriminated as a factor.

As far as the pathogenesis is concerned, the arteritis may be secondary to a cardiac lesion with the formation of an embolus obliterating the arteries. The arteritis, indeed, may be primarily due to a modification of the wall of the artery itself. The organisms become grafted on the intima, and with secondary spasm and modifications in the composition of blood, a thrombosis with gangrene may be produced. Indeed, the therapy, by acting on the sympathetic, seems to prove the role of the spasm. Lesions have sometimes been cured which at first had seemed irreversible.

Fig. 1. (Trillat, Notter) Gangrene of both feet secondary to postabortum infectious arteritis.

No matter how questionable the pathogenic mechanism may be, a true arteritis always produces interruption of the blood flow in the corresponding limb associated with mortification of tissue, which predisposes to pullulation of the organisms and gives the clinical aspect of gangrene.

The author enumerates the clinical symptoms of dry gangrene which are characteristic of arteritis. One seldom is dealing with multiple obliterations, extensive, fulminating, and beyond all means of therapy. Most of the time the gangrene is localized and produces a local mortification varying in size. The gangrene may occur from a few days to 5 weeks after the abortion or the delivery, usually with sudden onset of the pregangrene stage. Pain in the calf, intermittent claudication associated with a localized and severe tenderness, and a paroxsymal clinical course simulating Raynaud's syndrome in the upper extremities, are the cardinal symptoms.

The limb is pale and cold during the attack with absence of pulsation below the obliteration. The

blood pressure is low and the oscillations are of very small amplitude. Only arteriography will reveal the site and length of the obliteration, the condition of the arterial wall, and, finally, the existence and importance of the collateral circulation. Such a state progresses more or less rapidly, according to the type of therapy used, toward the picture of confirmed gangrene; muscular atrophy with retraction, muscular degeneration with ulcer formation, and, finally, the appearance of a line of demarcation between the dead and living tissue. Wet gangrene may appear at all stages of dry gangrene due to arteritis.

The diagnosis is easy at the stage of gangrene, but at the onset one must resort to oscillometry. Arteriography should be performed as soon as arteritis is suspected. All the intermediate stages may exist between pure arteritis and pure venous thrombosis. This explains why the etiological diagnosis is difficult inasmuch as both factors, arterial and venous, may be associated. As a rule, the venous participation is confirmed by the appearance of cyanosis, white and hard edema, and, at a more advanced stage, by the wet appearance of the lesions.

The prognosis is established in the light of the signs just mentioned. If the temperature of the limb remains normal during the pregangrene phase, an adequate arterial circulation is present and the stage of gangrene will not be reached. The prognosis is poor if the dry gangrene becomes complicated by wet gangrene due to phelebitis. Most of the time the prognosis cannot be established without oscillometry and arteriography. The better the collateral circulation is, the better the prognosis. However, one must remember that the gangrene can recur, even if localized and limited.

The treatment consists, first, in the prophylaxis of the infection—strict asepsis during all obstetrical procedures and postpartum care. Furthermore, anti-infectious therapy is instituted if the conditions of the delivery have made infection a possibility.

The curative treatment of the infectious forms is by means of vaccine, sulfa drugs, and penicillin.

Intravenous injections of acetylcholine have been advocated by Nolf.

Therapy, by way of the sympathetic system, will be used, especially as described by Leriche; unilateral or bilateral lumbar infiltrations, arterial sympathectomy, embolectomy and, finally, arteriectomy. One must resort to amputation only after everything else has failed. With the advent of modern therapy the prognosis of arteritis has been improved. The mortality rate has been reduced from 62 to 40 per cent. GERARD GAGNON, M.D.

NEWBORN

Swan, C., Tostevin, A. L., and Black, G. H. B.: Final Observations on Congenital Defects in Infants following Infectious Diseases during Pregnancy, with Special Reference to Rubella. *Med. J. Australia*, 1946, 2: 889.

Of the 61 children comprising the first and second series, 49 were re-examined. It was necessary to modify earlier assessments of the period of gestation at which the mother suffered from rubella in 22 of the 28 cases in which further information was obtainable. The period usually had been over-estimated. The most important result of the resurvey was the detection of 4 further cases of deaf-mutism. In 1 patient, spontaneous absorption of a cataractous lens had occurred. Many of the children were retarded in their physical development.

A fourth series consisting of 25 cases was studied. In 17 instances (one doubtful) the mother had contracted rubella in pregnancy. In 1 case, the mother had suffered also from chickenpox. Fifteen of the babies born subsequently exhibited congenital defects. The abnormalities included cataract, deaf-mutism, heart disease, microcephaly, umbilical hernia, bifid uvula, mental deficiency, epilepsy, speech defect, and concomitant strabismus. Thirteen of the 15 mothers had suffered from German measles during the first 4 months of pregnancy. Of 2 cases in which the infants were free from congenital malformations, the mother of 1 infant had suffered from the disease in the first month, and the other mother had had the disease in the seventh month of gestation. The infectious diseases during pregnancy in the remaining 8 cases included 3 cases of morbilli (one of the babies was abnormal), 2 cases of mumps (both infants had defects), 1 case of scarlet fever (the baby was normal), 1 case of "rheumatic influenza" (the infant was malformed) and 1 case of pustular rash (the baby was defective.) CHARLES BARON, M.D.

Valle, G.: Intrauterine Asphyxia and Apnea of the Newborn. On the Choice of a Method of Resuscitation in Apnea of the Newborn (Asphyxia intrauterina et apnea neonatorum. Sulla scelta dei metodi di rianimazione nell'apnea del neonato). *Ginecologia, Tor.*, 1946, 12: 1.

As regards the topic of resuscitation of the newborn it is impossible to control with scientific accuracy the effects of a single procedure and much less to judge the superiority of one method of resuscitation over another, even though one records a critical evaluation of a conspicuous amount of statistical material or possesses a very large personal experience.

In this article the author desires to show that no one single method of resuscitation up to this time satisfies completely all the manifold requirements which are demanded of a rational treatment of asphyxia of the newborn.

Choice of a procedure of resuscitation should be made in each individual case of apnea according to the existing conditions and methods of treatment at the obstetrician's disposal. Before each apneic baby receives specific treatment the following facts should be known: (1) cause of the apnea, (2) the mechanism by which the apnea developed and the duration of the asphyxia, (3) the prenatal and postnatal complications causing anoxemia, (4) the clinical form by which the apnea manifests itself, (5) the indications and the contraindications of each procedure, and (6) the circumstances surrounding each individual case.

The theory of resuscitation of the newborn is discussed in detail. The respiratory rhythm in extrauterine life, as it was formerly in intrauterine life, is activated essentially by chemical stimuli. After birth the bulbar centers of respiration are subjected to the influx of many afferent impulses, the most important of which act on the respiratory apparatus (distention and retraction of the lungs and passage of air into the bronchial tree) and originate in the carotid sinus (chemical stimuli which cause a variation in the composition of the blood). The fetus, moreover, comes to react to its surroundings (contact of air and temperature on the skin and mucosa, which leads to many reflexes on the neurorespiratory system.

The essential basis of the antiasphyxia treatment is the theory that a low oxygen tension in the blood stimulates the bulbar centers, while a further diminution of oxygen in the blood provokes a loss of excitability of the centers, the cells of which are very sensitive to the lack of oxygen. Oxygen determines the sensitivity of the neurorespiratory center, which then becomes capable of reacting to the specific stimulus, carbonic acid. Anoxemia, which lasts for a certain time, represents a positive stimulus for the refurnishing of the center with oxygen, otherwise all the vital functions are destined to be extinguished. Only a further increase in the tension of carbonic acid can compensate for the time being for the lack of oxygen and overcome the elevation of the threshold of excitability of the center. The low oxygen tension and the high carbon dioxide tension of the blood which are constantly present in the last months of pregnancy and which in a degree maintain intrauterine respiratory rhythm, are not able to stimulate the bulbar centers after birth, as these centers become sluggish and insensitive in spite of a noteworthy increase in carbon dioxide tension. In this condition (oligopnea, or apnea, conservation of muscular tone, reflexes, and cyanosis) the spontaneous increase of carbon dioxide does not succeed in overcoming the excitability of the threshold of the centers; then, an increase of oxygen and eventually an increase of carbon dioxide occurs (according to Henderson the relation is 90 to 10 for a short period of time and then it becomes 70 to 30). In this way cases of anoxemia of greater seriousness and duration (apnea, loss of tone, absence of reflexes) are produced and only the immediate increase of oxygen can assure life of the newborn.

In 1938 the author performed autopsies on babies who had died from asphyxia directly after birth or a few days thereafter. His study revealed that in certain cases death was the result of improper treatment. The most common errors were:

1. A tendency to proceed immediately with treatment without following certain indispensable preliminary measures, above all, without ascertaining whether the airways are completely unobstructed. Many babies were asphyxiated on account of the presence of meconium, amniotic liquid, blood, or mucus in the airways. No method of resuscitation would be successful unless the airways were unobstructed.

2. Utilization of brutal and inefficient methods of resuscitation.

3. Lack of respect for indications and contraindications for certain methods of treatment. Autopsies showed that apnea was accompanied by or provoked by hemorrhagic effusions, prematurity, and interference with extrauterine respiration; oftentimes apnea was secondary to cerebral compression. In the condition of grave asphyxia, often energetic measures which are dangerous are employed. A method of resuscitation, such as that of Schultze, might be dangerous in babies with cerebral hemorrhage. All methods of manual artificial respiration used on babies which are nude and exposed to cold atmosphere might predispose to a rapid loss of body heat and produce shock in the newborn. On the other hand, hypodermic injection of stimulants when the peripheral circulation has practically stopped is useless and inefficient. Gaseous stimulation is useless when the pulmonary circulation is absent.

4. A tendency to neglect newborn babies after resuscitation has started.

From histological examination of tissues removed from the lungs of babies who were born asphyxiated, then resuscitated by artificial respiration, and subsequently died a few days after birth, the author draws the following conclusions:

1. The frequency of large zones of atelectasis in the lungs of the newborn who died after a few days of life shows that it is not necessary for all pulmonary alveoli to be functioning in order to supply the necessary amount of oxygen for metabolism in the newborn. Only a moderate number are required. Methods of resuscitation should not produce hyperventilation of the lungs as this would be harmful to the child.

2. The physiological opening of the pulmonary alveoli is a gradual phenomenon, which takes place slowly and is not reproduced artificially in a short time by means of forced endotracheal insufflation; neither is it produced by means of mechanical expansion of the chest obtained by producing highly elevated negative pressure. During insufflation the vis a tergo should correspond to a forced pressure of from 5 to 10 mm. of mercury, and during mechanical respiration the negative pressure which should be exerted on the thoracic cage should not exceed that of a column of water of 10 c. c. in height.

3. Of the various methods of gaseous stimulation, the best are those in which the gaseous current is breathed by the newborn by active movement of its chest.

4. The procedures of artificial respiration which employ the more modern mechanical means ventilate the alveoli in a more physiological manner and are less harmful than rough manual methods.

A practical program of treatment for resuscitation. In general, all apneic or asphyxiated babies should be protected against loss of body heat, dryness, and overheating. All resuscitative measures which require the baby to be nude and which require the body temperature to be highly elevated, should not be used. The author considers the respiratory meth-

od of Drinker particularly adapted to the avoidance of shock in the infant.

Special regard should be given to relieving all obstruction of the airways. If the apnea is of light grade and cerebral hemorrhage does not exist, the baby, soon after birth, can be held by an assistant by the feet and kept head down while undergoing thoracic compression by the method of Prochownich. This is done in order to favor the outflow of aspirated material, and at the same time care is taken to cleanse the mouth and supralaryngeal air passages. This procedure seems especially applicable in cases of babies born in other than vertex positions because there is a lack of natural outflow of secretion during birth. If an intrabronchial aspiration is to be done, tracheal intubation is performed, the tube being left in place. Of all the ways of freeing the airways, laryngeal intubation is the most satisfactory.

Asphyxia of a mild grade is treated first with the preliminary measures as stated. If peripheral stimulation is needed, the simplest methods are those which do not produce cooling of the baby. Constant supervision is necessary after the baby has once started to breathe to avoid return of the asphyxia. If oligopnea is present, it should be treated by inhalation of oxygen or carbon dioxide, or both. The degree of cyanosis present serves as a guide as to which is to be used. In certain cases in which there is absence of thoracic mobility, the mechanical respiration of Drinker is indicated. Often the hypodermic injection of a small dose of stimulant to the respiratory center, repeated within 2 hours, may be used. Artificial manual respiration is contraindicated and superfluous.

The author believes that peripheral stimulation and inhalation without intubation is superfluous and contraindicated for asphyxia of medium grade. The procedures most efficacious are those producing mouth to lung insufflation or those requiring gasometers with reduction of pressure, always after tracheal catheterization and a few movements of artificial respiration in order to promote a negative pleural pressure. The author does not think that insufflation by means of an endonasal catheter assures alveolar ventilation. The respiratory method of Drinker is useful, when used before laryngeal intubation with the Nelaton catheter. Repeated stimulation with respiratory stimulants, hypodermically, is efficient in this type of asphyxia.

For asphyxia of the grave to the very grave type peripheral stimulation is inadequate or contraindicated. Also, procedures which require a certain period of time to act, such as inhalation without intubation and the hypodermic injection of stimulants for absorption, are contraindicated. Gaseous stimulation is of doubtful efficacy when the circulation is slow. The author prefers endofunicular injection of lobelia, combined with injections of drugs of the coramine type, in order to obtain an immediate reaction of the respiratory centers. An assistant holds an oxygen inhaler in the vicinity of the baby's mouth, and the gas will reach the alveoli in inspiration. If spontaneous respiration does not occur then the respiratory method of Drinker must be employed or if this is not possible, the method of Sylvester. If the baby is still moribund, cautious intracardiac injection of adrenalin is indicated. In all these cases after respirations have been started, the author recommends inhalation of a mixture of oxygen and carbon dioxide to stimulate the centers of respiration and to favor expansion of the thorax.

Complications of relapse of inactivity of the respiratory center, circulatory crises, and atelectasis are to be treated by means of respiratory stimulants repeated over a period of days, and by repeated systematic inhalations of carbon dioxide and oxygen.

Not all the methods used in institutions can be used in the home. When lack of personal assistance and instruments exists it is best to plan for emergencies ahead of time. Some procedures not recommended for use in the delivery room are useful and acceptable at home. Oxygen and carbon dioxide can be administered by means of portable machines. Artificial respiration according to the methods of Prochownich or Sylvester, or mouth to mouth insufflation, can be employed whenever it is not possible to use tracheal intubation.

Parenteral methods (intramuscular, endofunicular, and intracardiac) are more often indicated in treatment at home.

If there are no signs of respiration, maneuvers should be suspended after a period of one-half hour, unless there is some special indication for doing otherwise.

The author recommends special treatment in a variety of other conditions which are not so frequent.

BLACKWELL MARKHAM, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Selye, H., and Stone, H.: Pathogenesis of the Cardiovascular and Renal Changes Which Usually Accompany Malignant Hypertension. *J. Urol.*, Balt., 1946, 56: 399.

The literature in reference to renal hypertension is briefly reviewed, with particular reference to the endocrine activity of the kidney. The authors constricted the aorta between the right and left renal arteries to cause the left kidney to become afunctional from a urinary secretory standpoint, and, along with tubular epithelial necrosis or degeneration, the organ assumed the appearance of an endocrine gland. The authors found that this "endocrine kidney," although nonfunctional from a urinary standpoint, was apparently able to elicit the characteristic changes of hypertensive disease in the remaining cardiovasuclar system. This observation is contrary to the accepted views on the subject since it was thought that a kidney affecting such hypertensive changes must retain the power of urine formation.

The "endocrine kidney" was found to be responsive to pituitary extracts, as demonstrated by cellular activity in the tubular epithelium and volume increase of the organ. Furthermore, the compensatory renal hypertrophy as occasioned by unilateral nephrectomy is inhibited by the "endocrine kidney."

Partial constriction of one of the renal arteries was found to protect the affected kidney from nephrosclerosis, either of renal or pituitary origin, but the opposing kidney was afforded no protection. This finding, it was felt, substantiated the belief that increased intravascular pressure was necessary to induce nephrosclerosis in animals.

Periarteritis nodosa was found craniad to the partially occlusive ligature of the aorta and could be induced in animals with anterior pituitary extracts, which in addition produced corticoadrenal hypertrophy and hyperplasia. The adrenal vessels in this group frequently showed periarteritis nodosa, with necrosis in some instances; this completely destroyed the adrenals except for a small layer of subcapsular cells.

The article is well illustrated and contains a comprehensive discussion and correlation of clinical hypertension in reference to the nephrosclerotic steroids, nephrosclerotic pituitary hormones, and renotrophic hormones. ROBERT LICH, JR., M.D.

Salinger, H., and Saalberg, F.: Pyeloscopy. An Evaluation of the Method. *Acta radiol.*, Stockh., 1946, 27: 617.

Both intravenous and retrograde pyelography, in certain cases, leave both morphologic and dynamic facts undiscovered; this is due to limitations inherent in the method. The authors propose pyeloscopy, a combination of fluorscopy with serial exposures, to improve morphologic demonstration and functional mechanism demonstration. They use small spot films as in gastrointestinal roentgenography, and have devised a method of keeping the end of the ureteral catheter sterile while it is being handled in the dark. A compression apparatus for the ureter, devised by them, is also employed. In studying the phase of filling, the tip of the catheter is inserted into the renal pelvis, just beyond the ureteropelvic junction. As soon as the pelvis has been adequately filled, as seen fluoroscopically, the catheter is withdrawn to L, and the ureter then is filled. The patient is turned as required to demonstrate the entire caliceal system. For study of the morphologic details, the patient is turned, and is also studied upright and during extremes of respiration. Fluoroscopic observation and simultaneous palpation is also used. The speed of emptying is then observed fluoroscopically.

Fluoroscopically controlled pelvis filling makes it possible to outline the pelvis before pain or tension, with its sequelae, are felt. When a ureter is kinked or looped on an ordinary film, fluoroscopy will easily determine whether a respiratory movement or some similar physiologic effect has caused the ureteral distortion. Palpation during fluoroscopy will often demonstrate the relation of an abdominal tumor with the kidney. Pseudostrictures of the ureter are ruled out by fluoroscopy. When a hyperkinetic pelvis expels the dye during ordinary pyelographic filling, spot films taken at the very moment of filling will demonstrate the caliceal system easily. Lastly, a vague defect in the pyelogram may prove to be a pseudopathologic finding, and the fluoroscopic observation of the filling of the pelvis (pyeloscopy) will demonstrate that the filling defect is purely functional.

The authors conclude that pyeloscopy makes up for the shortcomings of intravenous and retrograde pyelography, and believe that every retrograde filling should be performed routinely under fluoroscopic control. DAVID ROSENBLOOM, M.D.

Begg, R. C.: Physiological Variations in Pyelograms Commonly Interpreted as Pathologic. *Brit. J. Urol.*, 1946, 18: 176.

The author studied the physiological variations in pyelograms which were commonly interpreted as pathological. He stated that the ureters, kidney pelves, and calices pass through wide variations in form and position, in accordance with bodily movement and posture, variable quantities of urine to be handled, fluctuations in the pressure, and the resistance to overcome. Many variations observed in pyelograms, such as nephroptosis, hydronephrosis, ureteral dilatations, strictures, and kinks are not pathological but are rather pictorial representations of

physiological or compensatory and reversible phenomena.

The present conceptions of a continuous peristaltic wave as a mechanism of excretion are untenable. The nature and basis of Fuchs' cystoid theory are discussed and applied, with modifications, to the interpretation of routine pyelography. The article is profusely and well illustrated. One of several practical points of the cystoid principle is that therapeutic dilatation of the ureter in the absence of organic stricture must be carried out with great circumspection as violent efforts to break the tone of the sphincters may result in material damage.

ROBERT TURELL, M.D.

Barquin, F. J.: Perirenal Air Insufflation. *J. Urol.*, Balt., 1947, 57: 1.

Perirenal air insufflation, in the author's experience, is a minor surgical procedure wherein visualization of the kidney and adrenal is accomplished by injecting air between the perirenal and retrorenal fascia. The technique as described is always carried out in the operating room, the patient being placed in the same position as for an exploration of the flank, with maximum elevation of the Pillet support in order to open the costoiliac space. The point of injection is determined by drawing a line from the costovertebral angle to the superior iliac spine. This line is divided into two equal parts, the upper half into two more equal portions, then the upper half of this is divided again into two parts. The point between these latter positions is the proper place for introduction of the needle. After sterile preparation, a spinal type needle 10 to 12 cm. long, is introduced; the point is directed upward and inward toward the spine and diaphragm. After approximately one-half the needle is introduced, it is observed for the detection of oscillatory movements synchronous with respirations, which would indicate that the needle is in the perirenal space pricking the kidney surface. When this oscillatory movement is noted, the needle is in the correct position and at this time the blood pressure is taken. Five cubic centimeters of normal saline solution are injected to separate the tip of the needle from the renal cortex. The needle is aspirated to make certain that it is not in a blood vessel, and, if all is well, air is injected (a 30 c.c. syringe full at a time) until a total of 600 to 900 c.c. has been reached. The author checks the blood pressure each time one syringe full (30 c.c.) of air is injected and has found in every case that a drop in systolic pressure, sometimes considerable, occurs. The diastolic pressure shows little variation. This drop in blood pressure is controlled by stimulants. Immediately after the last injection, anteroposterior and lateral films are taken.

The author concludes that with his technique the procedure is no longer dangerous. He believes that the deaths, previously attributed to gaseous embolism, have been due to a drop in the systolic blood pressure, produced during the injection by a reflex through the sympathetic pathways. This, he believes, is easily controlled by checking the blood pressure during the procedure and by the administration of stimulants as necessary.

A number of case histories are presented.

ROBERT O. BEADLES, M.D.

Romano, N., Eyherabide, R. A., and Nessi, C. T.: Diagnostic Lipiodography and Local Penicillin Therapy in Perirenal Abscess (La lipiodografía diagnóstica y la penicilinoterapia local en el absceso perirrenal). *Rev.-As. méd. argent.*, 1946, 60: 735.

Appreciative of the good results obtained in suppurative pulmonary lesions by local penicillin therapy, the authors tried the same method in treating a perirenal abscess. Intramuscular injections were given over the point of greatest tenderness. The needle was tried for pus, and air and lipiodol were injected. Roentgenologic studies were made, and the equivalent of 40,000 units of penicillin was instilled. This injection was reinforced with 20,000 units given intramuscularly every 3 hours in the usual places.

In 48 hours, the pain and swelling were remarkably diminished. A furuncle which appeared later was treated with the injection of 15,000 units of penicillin in the base, and 5,000 units injected intramuscularly.

The therapy resulted in a quick, effective response in both instances and the authors believe that its further application is justified.

STEPHEN A. ZIEMAN, M.D.

Hepler, A. B.: Bilateral Ureteral Duplication with Ectopic Ureter. *J. Urol.*, Balt., 1947, 57: 94.

The unusual features of the author's case, which suggested its presentation, were as follows:

1. The extent of the upper urinary tract anomaly with destruction of three-quarters of the renal mass. There was a bilateral pelvic and ureteral duplication with hydronephrotic destruction of both halves of the right kidney and the upper half of the left, the ureter from which terminated in the cervix of the uterus, yet this child was in vigorous health both before and after operation.

2. The impossibility of demonstrating the abnormal segments of the kidneys by urography, either excretory or retrograde. This made the diagnosis difficult and largely a matter of deduction.

3. The unusual location of the ectopic ureteral orifice, in the cervix of the uterus, which brings up controversial embryologic considerations.

4. The method of treatment.

The surgical indications and methods are numerous, as might be expected from the great variety of conditions to be met. Ureteroneostomies—that is, transplantations to the bladder, bowel, normal ureter, or pelvis—are contraindicated as operations of election. They may be necessary in the solitary kidney or where a single ureter is ectopic in the presence of bilateral disease. Here attempted conservation is imperative. However, the anomalous segment is usually so badly diseased that elective conserva-

tion is unwise and usually futile. Heminephroureterectomy is the operation of choice in the average case, and nephroureterectomy is favored when an entire kidney is damaged and the opposite one is normal.

When the segment of the kidney drained by the ectopic ureter is originally small, has undergone atrophy, and is not infected, Everett recommends ligation and resection of the abdominal portion only. However, if the ureter is dilated, as it usually is, the stump may be the source of continued drainage and infection. The removal of the entire ureter is a matter of very little additional surgery. Renal resection should always be done in conjunction with ureterectomy, when feasible, particularly when the anomalous segment is large, functioning actively, or is infected. In this patient the ureterectomy alone was warranted because of the risk of a heminephrectomy to the only remaining renal tissue.

JOHN A. LOEF, M.D.

Everidge, J., and Barnes, D. R.: Gunshot Wounds of the Ureter: 3 Cases, with Preservation of the Kidney in 2. *Brit. J. Urol.*, 1946, 18: 166.

The authors have presented in detail 3 personal cases of trauma to the ureter sustained in warfare. They state that few cases of war trauma of the ureter have been recorded, probably because of the high mortality resulting from concomitant or associated injuries.

Clinically, cases of ureteral injury present hematuria, either evidence of a urinary fistula which tends to appear in a week after the injury is sustained, or symptoms and signs of retroperitoneal abscess of a low-grade infection. There is no significant early diagnostic picture of ureteral trauma. The early case could only be diagnosed by obstruction to the passage of a ureteral catheter or by surgical exploration. Excretory urography is equivocal and seldom justifies an immediate exploration.

ROBERT TURELL, M.D.

Davis, D. M.: Intubated Ureterotomy. *J. Urol.*, Balt., 1947, 57: 233.

A series of cases is presented in which ureteropelvic obstruction with resulting hydronephrosis was relieved by a procedure which the author terms "intubated ureterotomy." The ureter was split longitudinally throughout the length of its narrowed portion and intubated with a gall bladder T-tube (Fig. 1). The narrow ribbon of ureter was held close to the T-tube by a few sutures of 000 plain catgut. The T-tube remained in place for approximately 4 weeks following the operation, in the main case cited, and was then removed.

The author states that in no case in which this procedure was employed has there been a true failure. Symptoms have been relieved in every case. A residual urinary infection was present in 2 cases and subsided spontaneously in 2 years in 1 of the cases. All of the other cases were symptom free and showed sterile urine. The patient who has been followed up for the longest period of time shows a normal urinary tract on the operative side 4 years and 3 months following surgery.

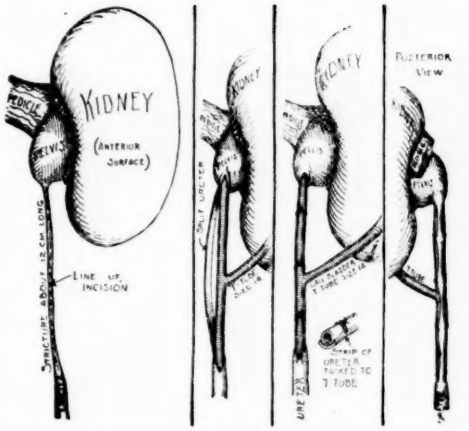

Fig. 1. (Davis) Stenotic part of ureter incised for its entire length, T-tube inserted, ureteral ribbon held in contact with T-tube by a few sutures of fine plain catgut.

CLARENCE V. HODGES, M.D.

BLADDER, URETHRA, AND PENIS

Prather, G. C.: Spinal Cord Injuries: Care of the Bladder. *J. Urol.*, Balt., 1947, 57: 15.

The author believes that the sequence of events in reference to the bladder, following serious trauma to the spinal cord, may be divided into three stages. The first is that of an atonic, neurogenic bladder. Cystometric studies at this time reveal a large capacity, low pressure, and no evidence of a reflex detrusor action. The second stage is that of an autonomous neurogenic bladder with periodic overflow incontinence. There is higher intravesical pressure, and reflex contractions occur but are not sufficient to empty the organ. The third stage, in patients with partial transection, is characterized by voluntary micturition; in patients with complete transection, it is characterized by an autonomic bladder with periodic involuntary emptying.

The author observed 130 patients with cord bladder, who were treated during military service under the following regimen: drainage was provided by either a suprapubic tube or a urethral catheter, and a closed system of drainage and irrigation was established. Routine intravenous urograms were done and routine cystometric studies were deemed essential to determine the stage of bladder recovery and indicate when to institute voiding trials. When the patient's general condition was satisfactory and cystometric studies indicated the likelihood of success in voiding, the suprapubic tube was removed, a urethral catheter was inserted, and the sinus allowed to close. Voiding trials were then instituted under close observation. Following this regimen in 21 cases of

complete transection, there were 2 deaths; 61.9 per cent of the patients with autonomic bladder voided within 3 to 10 months after injury. Forty patients underwent partial transection, with no deaths, and 97.5 per cent of these resumed voluntary voiding in an average time interval of 3 months.

As a result of his experience, the author suggests the following program of bladder care for patients with spinal injury. If the patient goes into retention, a No. 18 soft rubber catheter is placed indwelling and connected with a closed system of either manual or tidal irrigation. If a partial transection has occurred, urethral catheter drainage is continued in the hope of an early return of function. If there is severe cord injury, a suprapubic cystotomy is done. Periodic cystometric studies are carried out. Intravenous urograms and periodic kidney, ureter and bladder plates are made, to observe the status of the upper urinary tract. When the general condition of the patient has improved and the bladder shows a satisfactory cystometric response, measures are instituted to permit it to resume activity. The aim of treatment should be voluntary micturition in those patients with partial transection, and involuntary periodic autonomic micturition in those with complete transection.

ROBERT O. BEADLES, M.D.

Bettman, A. G.: Anastomosis between the Ureter and Urinary Bladder by Means of a Subcutaneous Skin Tube. *Plast. Reconstr. Surg.*, 1947, 2: 80.

The author reports the case of a 50 year old woman who had had a nephrectomy 20 years previously, on the right side, for calculous disease; in 1942, a left ureterocutaneous implant was carried out because of left ureteral obstruction. A subcutaneous skin tube connecting the ureteral fistula orifice with the bladder was successfully made.

The first operation, performed under local anesthesia, consisted of the preparation of a skin-lined tube, sutured over a catheter, from the fistula to the suprapubic area. Later, after irrigation had demonstrated the tube to be patulous, the lower end of the skin tube was implanted into the bladder. Subsequently, fluid was easily passed through the tube into the bladder and was voided. Twenty-six days after the implantation, cystoscopy showed that the implanted tube formed an ostium and that fluid could be seen coming from it into the vesical cavity. At the third operation, the upper end of the tube was connected to the ureterostomy under local anesthesia, and since that time urine has entered the bladder as fast as 1,100 c.c. during a period of 24 hours.

The authors believe that the entire anastomosis can be performed in 3 months or less. The three previously mentioned steps are necessary, and sometimes a fourth procedure for closure of any small remaining sinus. The patient should be warned not to lie on the subcutaneous tube. The present report is based on one case only, but from the experience with it, the operation seems entirely feasible.

DAVID ROSENBLOOM, M.D.

GENITAL ORGANS

Dean, A. L., and Woodard, H. Q.: Differential Diagnosis of Tumors of the Prostate and Adjoining Areas. *J. Urol.*, Balt., 1947, 57: 172.

Patients with tumor of the prostate and adjoining areas of the rectum or bladder frequently present difficult diagnostic problems. Now that hormone treatment of extensive neoplasms of the prostate is of such benefit, it is of great practical importance to know whether these tumors originate in the rectum or bladder and subsequently grow into the prostate, or whether they originate in the prostate and later involve the bladder or rectum. In obscure cases one can show whether the tumor does or does not originate in the prostate by measuring the acid phosphatase activity of extracts of tumor tissue removed through the cystoscope or proctoscope.

Chemical analysis provides a clear-cut differentiation of these tissues because normal rectal mucosa and rectal or bladder carcinoma have acid phosphatase activities which are only one one-hundredth to one one-thousandth as great as that of prostatic tissue. The acid phosphatase activity of prostatic tissue is so high that if the activity of a specimen exceeds 10 units per gram, it is reasonable to assume that it is of prostatic origin. The necessary amount of tissue can be obtained with 3 or 4 bites of the biopsy forceps commonly used through a cystoscope.

The authors cite a case history of a patient who had an infiltrating rectal tumor. The tumor tissue removed from the rectum contained 39 units of acid phosphatase and .05 units of alkaline phosphatase per gram. The patient was treated by colostomy and castration. Since the operation he has enjoyed 22 months of productive life.

DAVID ROSENBLOOM, M.D.

Goodwin, W. E.: Multiple, Benign, Fibrous Tumors of the Tunica Vaginalis Testis. *J. Urol.*, Balt., 1946, 56: 438.

The author discusses benign fibrous tumors of the tunica vaginalis testis, reviews the available literature, and points out the apparent confusion on the subject. Included in the reviewed material are 40 protocols of the Army Medical Museum, placed in the category of "chronic proliferative periorchitis." In addition, studies were made of 12 cases from the Brady Urological Institute; 5 of these are tabulated. Seven cases were selected from the Army Medical Museum group, and in only 3 of these was the correct diagnosis made preoperatively. Another group of 16 cases, culled from the records of the Army Medical Museum, were described pathologically, but an inadequate report of the clinical examination accompanied the cases so that a clinical and pathological correlation was impossible.

Clinically, the condition occurs in patients of from 20 to 40 years of age, particularly during the latter part of the third decade. The mass is usually discovered accidentally by either the patient or the physician. It presents itself as an extratesticular

mass extending upward from the upper pole of the epididymis, seemingly originating from either the cord or the epididymis. The tumor is characterized as a stony, hard, freely movable, multilocular mass which may suggest a calcified varicocele, and roentgen-ray studies may confirm the presence of intratumor opacities.

Treatment indicated is operative exploration. Extratesticular masses may be benign, in which case epididymectomy and excision of the tumor is indicated. In suspicious cases, orchectomy should follow only the determination of neoplasia upon frozen section.

Grossly the tumor is a multiple fibroma and the characteristic microscopic picture is that of whorls of fibrous tissue with a few typical spheroids, vessel wall thickening with some areas of hyalinization and, often, calcification. The typical findings of chronic inflammation are routine. The tumors are referred to as "multiple fibromata of the tunica vaginalis."

ROBERT LICH, JR., M.D.

Kelby, G. M., and Stenstrom, K. W.: The Treatment of Malignant Tumors of the Testis. Review of 100 Cases. *Radiology*, 1947, 48: 1.

A study of 100 testicular tumors treated at the University of Minnesota Hospitals, Minneapolis, from 1926 to 1934 is reported. Thirty-four were not classified as to type; 37 were seminomas and 29 were carcinomatous mixed tumors according to E. T. Bell's classification. The average age of the patients with seminoma was 37.6 years and of those with carcinomatous mixed tumor, 29.4 years. A history of trauma was obtained in 15 per cent of the cases. Cryptorchidism was present in 8 patients and hydrocele in 6.

TABLE I.—THIRTY-SEVEN CASES OF PROVED SEMINOMA OF THE TESTIS

Year	No. of cases	Years of survival									
		1	2	3	4	5	6	7	8	9	10
1930	1	1	1	1	1	1	1	1	1	1	1
1931	0	0	0	0	0	0	0	0	0	0	0
1932	1	1	1	1	1	1	1	1	1	1	1
1933	6	6	4	3	3	3	3	3	2	2	2
1934	2	2	1	0	0	0	0	0	0	0	
1935	1	1	1	1	1	1	1	1	0		
1936	2	2	2	2	2	2	2	2			
1937	1	0	0	0	0	0	0				
1938	2	2	1	1	1	1					
1939	5	4	4	4	4						
1940	3	2	2	2							
1941	1	1	0								
1942	6	3									
1943	6										
No. cases	37	31	25	24	21	16	14	13	11	10	8
No. living		25	17	15	13	9	8	8	4	4	4
Per cent		81	68	62	62	56					

Metastases were present in 65 per cent of the cases at the start of irradiation treatment.

TABLE II.—TWENTY-NINE CASES OF PROVED CARCINOMATOUS MIXED TUMORS OF THE TESTIS

Year	No. of cases	Years of survival					
		1	2	3	4	5	6
1926	1	1	1	0	0	0	0
1927	0	0	0	0	0	0	0
1928	0	0	0	0	0	0	0
1929	2	0	0	0	0	0	0
1930	0	0	0	0	0	0	0
1931	0	0	0	0	0	0	0
1932	3	1	1	0	0	0	0
1933	2	1	0	0	0	0	0
1934	1	0	0	0	0	0	0
1935	2	1	0	0	0	0	0
1936	2	1	0	0	0	0	0
1937	3	3	3	1	1	1	1
1938	3	1	0	0	0	0	
1939	1	1	0	0	0		
1940	2	1	0	0			
1941	3	0	0				
1942	2	0					
1943	2						
No. cases	29	27	25	22	20	19	16
No. living		11	5	1	1	1	1
Per cent		41	20	5			

Metastases were present in 86 per cent of the cases at the start of irradiation treatment.

The treatment consisted of simple orchectomy followed by irradiation immediately whenever possible. However, the average time interval between operation and irradiation was 3½ months. Cases without demonstrable metastases received about 2,000 r. in air in fractionated doses to an anterior and posterior abdominal portal each over a period of 3 weeks. If a large abdominal mass was present, intense treatment was at first directed to it. Other areas were irradiated thereafter if a local response had occurred. Six advanced cases were irradiated only, whereas 4 cases were subjected to Hinman's dissection (a more radical operation), which was followed by radiation treatment.

The results are shown in Tables I, II, and III.

The authors arrived at the following conclusions:

1. Tumor of the testis is frequently found in patients with hydrocele.

TABLE III.—THIRTY-FOUR UNCLASSIFIED CASES OF MALIGNANT TUMORS OF THE TESTIS

Year	No. of cases	Years of survival									
		1	2	3	4	5	6	7	8	9	10
1926	1	1	0	0	0	0	0	0	0	0	0
1927	1	1	0	0	0	0	0	0	0	0	0
1928	0	0	0	0	0	0	0	0	0	0	0
1929	3	1	0	0	0	0	0	0	0	0	0
1930	2	0	0	0	0	0	0	0	0	0	0
1931	1	1	0	0	0	0	0	0	0	0	0
1932	4	1	1	1	1	1	1	1	1	1	0
1933	0	0	0	0	0	0	0	0	0	0	0
1934	4	4	1	1	0	0	0	0	0	0	
1935	4	2	1	1	1	1	1	1	1		
1936	3	3	3	2	2	2	2	2			
1937	2	2	2	2	2	2	2				
1938	3	3	2	2	2	2					
1939	2	2	2	2	2						
1940	2	0	0	0							
1941	2	2	2								
1942	0	0									
1943	0										
No. cases	34	34	34	32	30	28	25	23	20	16	12
No. living		23	14	11	10	8	6	4	2	1	0
Per cent		68	41	34	33	29	24				

Metastases were present in 70 per cent of the cases at the start of irradiation treatment.

2. As in all malignant tumors, early diagnosis is of utmost importance.

3. A differential diagnosis should be made histologically so that each testicular tumor can be classified correctly.

4. Seminoma is a malignant tumor which forms metastases rapidly.

5. Seminomas of the testis are radiosensitive. The patient should have the benefit of x-ray therapy regardless of the stage of metastasis present.

6. There should be no delay in instituting irradiation following simple orchectomy.

7. Frequent follow-up examinations should be done.

8. Simple orchectomy followed by irradiation is the treatment of choice in seminomas.

9. The carcinomatous mixed tumors should be treated by radical dissection, and adult teratoma by simple orchectomy. GERHART S. SCHWARZ, M.D.

MISCELLANEOUS

Dodson, A. I., and Clark, J. R.: Urinary Calculi in the Negro. *J. Am. M. Ass.*, 1946, 132: 1063.

The prevalent belief that the negro race has a natural immunity to urolithiasis prompted the study of the incidence of urinary calculi in the North American negro who seems to have lost some of that immunity. It was hoped that such investigation may throw some light on the complex problems of the etiology of urolithiasis.

In the experience of the authors, urolithiasis is not an unusual occurrence in the American negro. It appears that the natural immunity of the negro is modified by his way of living and the frequent occurrence of uroinfection. The negro with urolithiasis has a high incidence of alkalinuria and infection. Most of the calculi are of the alkaline variety. The distribution of urolithiasis in American negroes as to sex and age is similar to that in the white race.

ROBERT TURELL, M.D.

Delatte, L. C.: Epithelial Rests of the Mucosa of the Urinary Apparatus (Los nidos epiteliales de la mucosa del aparato urinario). *Arch. espan. urol.*, 1946, 3: 29.

This article attempts to explain the significance of Brunn's epithelial rests which are found in the urinary mucosa. These are redundant accumulations of cells which penetrate deeply into the submucosa and which are completely separated from the other epithelial cells by a thin capsule of connective tissue. Apparently glandular in formation, they are not considered abnormal, although they should be included in pathologic conditions. They are the result of proliferation of the mucosa under various circumstances.

They are found to be associated with chronic irritative processes, polypoid growths of inflammatory origin, ulcerations of the bladder, carcinoma and adenoma of the prostate, and neoplasms of the bladder. STEPHEN A. ZIEMAN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Heublein, G. W., Moolten, S. E., and Bell, J. C.: Some Observations Concerning Ewing's Tumor Seen in an Army General Hospital. *Am. J. Roentg.*, 1946, 56: 688.

Patients with bone tumors constituted a relatively high percentage of the admissions to the Percy Jones General Hospital, Battle Creek, Michigan. The ratio of malignant bone tumors was 1 to each 1,263 admissions. The authors conclude that regardless of the form of treatment, the prognosis of Ewing's tumor is grave. Six of 10 patients in their series were dead, or dying, within an average period of 19 months after the onset of symptoms.

The tumor spreads through the blood and lymph, especially the latter, and not infrequently involves the regional lymph nodes, but is commonly characterized by involvement of all bones of the skeleton, especially the skull, in contrast to osteogenic sarcoma. The most frequent involvement, as seen at autopsy, was the lungs and the skull.

The location of the tumor is most common in the "pipe" bones, especially the tibia, fibula, humerus, ulna, or femur, in approximately that order. Occasionally the clavicles, tarsal bones, ribs, vertebrae, mandible, skull, shoulder girdle, and pelvis are involved.

The following clinical findings are encountered with surprising frequency: (1) history of trauma, (2) intermittence of symptoms, including fever, (3) a mistaken diagnosis of chronic osteomyelitis in the case of long bones, or (4) of tuberculosis in the presence of vertebral involvement.

Certain features of the histopathology of the disease deserve emphasis and may provide a basis for classification. These are (1) the lack of intercellular matrix, (2) the rudimentary cell type with slight, if any, differentiation toward a spindle cell, (3) the remarkable uniformity of the tumor cells both in the primary lesion and in the metastases, (4) the lack of marked anaplasia histopathologically, despite the obvious malignancy of the disease, and (5) the striking morphologic similarity between tumor cells and the cells of the normal embryonal tissues in an exceedingly primitive stage of development.

In all these tumors, the characteristic feature is the monotonous regularity and uniformity of cell type, the rounded delicate nucleus, scanty cytoplasm, the syncytiumlike formation of solid sheets of tumor in which the scanty cytoplasm is faintly stained or indistinct, and the lack of differentiation into any well defined structural units, except perhaps occasional formation of rosettes and pseudorosettes, especially around blood vessels.

If there is any probability of a lesion being a Ewing's tumor, the importance of the therapeutic test should not be overlooked. Small doses of 100 to 150 roentgens will often cause rapid regression of the tumor so that after as few as two to three treatments, the patient's night pain is completely relieved.

If the lesion involves a considerable extent of the shaft of a long bone with slight evidence of periosteal reaction to begin with, but following therapy shows evidence of considerable deposition of calcium in the periosteal and subperiosteal region, and if at the same time the patient has had marked relief of pain within 2 to 4 days after the onset of deep roentgen therapy, the diagnosis of Ewing's tumor can usually be made without hesitation.

The authors warn that syphilis may be a pitfall in the diagnosis. In one of their cases a history of chancre, together with roentgen evidence of spontaneous regression in the size of the tumor, made diagnosis difficult. C. FRED GOERINGER, M.D.

Ferrandu, S.: Solitary Xanthomas of the Synovial Membrane of the Joints: a Clinical and Anatomopathologic Study and Investigation of the Etiopathogenesis (Gli xantomi solitari della membrana sinoviale delle articolazioni: studio clinico ed anatomo-patologico e ricerche sull'etiopatogenesi). *Chir. org. movim.*, 1946, 30: 189.

Tumors of the joints are very rare, particularly xanthomatous tumors. The author reports 3 cases of solitary xanthoma of the synovial membrane of joints, 2 of the elbow and 1 of the left temporomandibular joint. In 2 of these cases the tumor was outside of the joint but connected with it by a pedicle originating from the synovial membrane.

The article is illustrated with photographs of the cases and microphotographs of the histological findings, showing the characteristic xanthoma cells and the giant cells so common in these tumors. The clinical and anatomopathologic pictures are described but the chief emphasis is placed on the study of the etiology. The conclusion is reached that solitary xanthomas of the synovial membrane may be considered benign mesodermic tumors based on defective development; they sometimes become inflamed, particularly if for any cause there is an increased lipid content, and particularly an increased cholesterol content in the blood.

In other studies of patients with xanthomas the author has found increased blood lipids, total fats up to 34.8 gm. per 1000, a total cholesterol of 7.2 gm. per 1000, a free cholesterol of 2.88 gm. per 1000, and a cholesterol ester of 4.32 gm. per 1000, accompanied by a decreased basal metabolism down to as low as 33 per cent, and Bufano's amino-acid curves were barely sufficient or even actually insufficient. He believes this deviation in lipid metabolism is due to hypofunction of the thyroid and liver.

In his own cases he did not find any clinical evidence of changes in the posterior hypophysis, the

gonads, or the suprarenals, and the blood content of sodium, potassium and chloride was normal, as well as the blood pressure. The author believes that cholesterol is the determining factor in the production of these tumors in individuals with hypofunction of the liver and thyroid and with defective development of the tissues, although he admits that this is not yet definitely proved.

AUDREY G. MORGAN, M.D.

Bayrd, E. D., and Heck, F. J.: Multiple Myeloma. *J. Am. M. Ass.*, 1947, 133: 147.

The present study deals with 83 cases of multiple myeloma in which the diagnosis was verified by examination of the pathologic material. The study includes all such cases seen at the Mayo Clinic through December, 1945. Forty-nine cases were confirmed by means of sternal aspiration, 26 by biopsy, and 8 by autopsy. In this study pain was present in 86 per cent of the cases at the time of first admission of the patients, which makes it the most constant finding by far. Pathologic fracture was encountered in a surprisingly small number of the cases (16 %), although, occasionally, evidence of old fracture of the ribs was present on roentgenologic examination of the thorax. Neurologic manifestations, such as root pain (often a rather early development), were encountered in 12 cases (14 per cent). Abnormal bleeding was observed in 6 instances in their series and in 2 it was a distressing and most troublesome symptom, so much so that 1 of the patients was given radium therapy locally in an endeavor to stop it. Tumor formation was noted rather infrequently as compared to Batt's series, being found in only 10 cases with a distribution as follows: clavicle (3), skull (2), humerus (1), ribs (2), sacrum (1), and sternum (1). Pulmonary and gastrointestinal symptoms were no more frequent than one might have expected in a group of debilitated people in this age range, and the authors were unable to develop any pattern of association, such as suggested by previous authors. The average and median ages of the patients were virtually the same, approximately 57 years, which agrees closely with the reports of others. There was an age span of 20 years on either side.

In 82 of the cases reported, roentgenograms were available. In 64 of these (78 per cent) multiple lesions were demonstrated. Other changes which occur with appreciable regularity are chiefly noted in the spinal column and include osteoporosis, compression of the vertebral bodies, and ballooning of the intervertebral discs.

Bence-Jones protein is the most significant of the clinical laboratory findings in cases of this disease. Bence-Jones proteinuria appeared in 40 (53 per cent) of 76 cases in which the urine was tested. Fifty-six cases were found in which the diagnosis of multiple myeloma was the most acceptable from clinical and laboratory standpoint (only 19 of these were pathologically confirmed). The significant hematologic findings in these 56 cases were (1) anemia, (2) excessive formation of rouleaux, (3) immaturity of both erythrocytes and leucocytes, (4) lymphocytosis, (5) eosinophilia, and (6) the presence of myeloma cells and atypical plasma cells. In 55 of the 83 cases in this series total serum protein estimations were made. In 40 of these (73 per cent) the concentration of protein was elevated above a level of 8.0 gm. per 100 c.c. In this series, serum calcium determinations were obtained in 41 instances, serum phosphorus determinations in 36 cases, and alkaline phosphatase (Bodansky) determinations in 24 cases. In only 8 instances (20 %) of this group did the serum calcium exceed 12.0 mgm. per 100 c.c. The highest values were 15.6, 15.7 and 15.9 mgm. per 100 c.c. The serum phosphorus averaged 3.41 mgm. per 100 c.c., ranging from 0.8 to 14.3 mgm. per 100 c.c. Twenty-eight of the 36 estimations were between 0.8 and 4.2 mgm. per 100 c.c. The alkaline phosphatase ranged between 0.8 and 12.3 units (Bodansky) and averaged 3.02 units; 21 of the 24 determinations were found to be within 0.8 and 3.6 units and averaged 2.13 units.

In 5 of the cases albuminuria was the outstanding symptom on admission. Fifty-one patients in this group (61 per cent) exhibited varying degrees of renal impairment as evidenced by albuminuria (grade 2 or more on a basis of 1 to 4, and with or without casts), red blood cells, or an elevated blood urea.

Unfortunately, there is as yet nothing of proved worth, either curative or palliative, to be offered to patients who have multiple myeloma. Coley's toxin, roentgen therapy, and radioactive phosphorus have been tried by the authors and others with indifferent results, although occasionally with relief of pain. More recently, radioactive strontium has been used. Nothing is known of the comparative value of this substance and radioactive phosphorus at present. Fifty-five patients in this group were followed up until the time of their death. For 11 others who are still living, follow-up reports are available. In the 55 who died, the average duration of the disease from the onset of symptoms was 18.8 months. The median duration was 15 months. The longest period of survival was 84 months and the shortest was 1 month. The usual duration of symptoms before the patient's first visit to the clinic was 8 months, and the expectation for survival thereafter averaged 10 months and varied between 1 week and 72 months. No correlation between life expectancy and the form of treatment was noted. In 27 cases in which the serum proteins were found to be elevated, the average duration was 18.1 months and the average survival after examination was 6.1 months. In 30 patients having Bence-Jones proteinuria who were followed up, the duration of the disease averaged 23.7 months and ranged from 1 month to 7 years.

Kestler, O. C.: Pronation Contracture of the Forearm of Unusual Etiology. *Bull. Hosp. Joint Dis.*, N. Y., 1946, 7: 75.

The author warns that in cases of operation performed in the proximity of the distal radioulnar joint, adhesions interfering with supination and pronation and resulting in painful disability, may develop. This

is particularly prone to occur if the capsular ligament is cut and subsequently sutured. In a dissection of several cadavers the author discovered a thick ligamentous structure which is the capsular ligament of the distal radioulnar joint lying just under the tendon of the extensor digiti quinti proprii. The capsular ligament of the distal radioulnar joint is tightest on the dorsal aspect during pronation, and is tightest on the volar surface in supination. From this it was concluded that it was advisable to immobilize the forearm in a plaster of Paris bandage in the neutral position, which is the position in which the ligament is relaxed.

These conclusions were based on the study of a 26 year old white female who sustained an injury to the left wrist when she struck her limb on the edge of a machine in a hat factory. Subsequently a mass developed on the dorsal and inner aspects of the left wrist. An x-ray film was taken and it was reported to be negative. The swelling was diagnosed as a double ganglion and it was excised under general anesthesia. A plaster of Paris cast was applied for a period of 2 weeks.

Examination some 6 months later indicated that the patient had a pronation contracture of the forearm and that active supination was impossible. A dimpling of the skin at a point corresponding to the dorsum of the distal radioulnar joint was noted when supination was forced with the patient under anesthesia. This band could be palpated. By forceful manipulation an audible snap was heard and the contracting band disappeared. However, complete supination could not be obtained until a scalpel had been introduced between the ulna and the skin at the site of the scar, and the band had been divided. Months after the operation there was still about 10 per cent loss in active supination.

C. Fred Goeringer, M.D.

Allen, I. M.: Atrophy of the Outer or Radial Side of the Thenar Eminence: A Benign Disorder. *N. Zealand M. J.*, 1946, 45: 549.

The author presents a series of cases of benign atrophy of the radial portion of the thenar eminence. In every case there was a partial, sometimes sharply defined, atrophy of the radial portion of the thenar eminence. In many cases the muscles of that part had diminished to such a degree that the radial edge of the first metacarpal bone, especially at its base, was visible and easily palpable. From inspection and palpation, the impression was that the muscles involved were the abductor pollicis brevis and the opponens brevis.

In a study of the nerve supply to these muscles, Saunders found that the branches of the median nerve ran a highly recurrent course from its origin beneath the transverse carpal ligament. In some cases, separate branches ran to the abductor pollicis and to the oppenens pollicis; in other cases the nerve occupied (for part of its course) an unprotected position just beneath the skin, where it was exposed to trauma, which is possibly an important factor in the production of the syndrome. Other cases of atrophy, without a history of injury, may be explained by the possibility of a frank polyneuritis. In some cases there is evidence to show that the affected portion of the thenar eminence and its nerve supply may be prone to a developmental defect.

The author made a study of the essential features of 11 of the 22 cases which he investigated.

C. Fred Goeringer, M.D.

Guri, J. P.: The Formation and Significance of Vertebral Ankylosis in Tuberculous Spines. *J. Bone Surg.*, 1947, 29: 136.

Tuberculosis of the spine cannot be said to be healed until there is a fusion of the affected bodies. When ankylosis has occurred, recurrence of the disease and increase in the deformity are not observed. The most rapid formation of vertebral synostoses occurs in cases with circumscribed foci localized near the margin of the vertebral bodies (average time 1½ years after onset of the symptoms). Cases presenting destruction in the paradiscal areas ankylosed in 3 or 4 years; in cases characterized by progressive thinning of the intervertebral space, fibrous union was obtained in 4 or 5 years.

The formation of a vertebral block composed of two or more vertebral bodies is influenced in speed and type of formation by the segment of spine involved (cervical, thoracic, lumbar).

When the disease process involves the center of the vertebral bodies, loss of the intervertebral joint space occurs rapidly.

Spinal fusion prior to formation of a sound vertebral block of the anterior spine does not prevent further deformity or spread of the disease.

Body ankylosis may not be obtained in children even after very prolonged periods of treatment with or without a spinal fusion.

Vernon C. Turner, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Kelly, R. P.: Skin Grafting in the Treatment of Osteomyelitic War Wounds. *J. Bone Surg.*, 1946, 28: 681.

In some war wounds, loss of both bone and soft tissue is so extensive as to preclude secondary closure, and some other means must be sought for inducing prompt healing. Free skin grafts will often effect healing in such wounds. There is little basic difference between closure by skin grafts, either free or pedicled, and secondary or primary closure.

Saucerization is a procedure which involves removal of all dead or devitalized tissue, and the contour of the wound is so arranged that application of appropriate pressure to a skin graft will be possible.

Usually, a free graft is applied to the saucerized wound as a temporary measure; it is best done about 4 days after saucerization, but grafts may be applied at the time of this operation or as long as 6 weeks later. The receptiveness of the bed for grafts

is determined by its gross appearance. Areas which appear necrotic must be removed by further surgery until one finds only healthy tissue when the wound is inspected. A free graft of 0.016 inch thickness is probably ideal.

Direct application of pedicled flaps to saucerized wounds is not frequently done because the preparation of the flap takes advanced planning which is not usually possible before the wound is saucerized. The planning of the pedicled flap is best done at the time of saucerization.

Sometimes the application of split free grafts results in such improvement of the local conditions that secondary closure is possible at a later date without making use of flaps.

Abdominal flaps have been most satisfactory for upper extremity defects. Usually the donor site of such grafts can be closed by undermining and approximating the skin edges. Careful advance planning is stressed. It is well not to denude the area to be resurfaced until a transferable flap has been assured. Adhesive strapping is a satisfactory immobilizing agent for most abdominal flaps.

When cross leg pedicles are used, a dermatome graft is usually placed beneath the pedicle at the end of the second week of preparation. Immobilization of the legs is accomplished by plaster, the casts being applied to the legs individually after study of the exact position which the joints must occupy in the intended position of graft application. The casts may be joined easily afterward at the time of the transfer of the pedicle to its new site.

The author has had no success with autogenous iliac-bone chips as a means of filling dead spaces beneath grafts. Carefully planned tubed pedicle grafts bearing a large amount of fat which can be used to fill deep defects are believed to be useful. The use of acrylic implants to fill defects is mentioned, but is not discussed at length. NEWTON C. MEAD, M.D.

Hodgen, J. T., and Frantz, C. H.: Arrest of Growth of the Epiphyses. *Arch. Surg.*, 1946, 53: 664.

Since the original description of epiphyseodesis by Phemister, in 1933, various modifications of technique have been presented, including the recently announced use of staples by Blount. These methods are fully described and illustrated.

The most important phase of the operation is the determination of the optimum time to proceed, and the decision as to which epiphysis (or epiphyses) is to be approached. The table of average growth expectancy is a sound basis from which to calculate when the proportion of growth which each epiphysis contributes is known. Girls do not grow after menstruation has begun, and thus mature earlier than boys. Generally speaking, the growth of the long bones ceases at 14 years in girls and at 16 years in boys. A roentgenogram of the carpus, interpreted according to Todd's skeletal maturation scale, is a substantial aid in fixing the child's maturation age which may vary a year from the chronological age in apparently normal children.

Clinical methods of measuring leg length are subject to some error hazards; roentgenological examination is more accurate and makes a permanent record. A simple fluoroscopic check is done by placing blocks of known height under the short foot until the pelvis is seen to be level in the fluoroscopic field, and then measuring the total block height. No corrections are necessary and the method is simple. Particular attention is called to young children with old septic or tuberculous arthritis of the hip, in whom premature closure of the epiphyses about the knee on the affected side is usual. A method for calculation of the optimum time and site for surgery is presented in the formula:—

$$\frac{\text{shortening present}}{\text{growth expected}} = \text{percentage of growth to be eliminated.}$$

This figure is correlated with the known percentage growth from each epiphysis in the lower extremity.

The surgical technique must be painstaking, and the procedure carried out in a dry field by the use of a pneumatic tourniquet. Patients may walk on crutches in 10 days, and the application of a plaster dressing is optional. Progress of closure of the epiphyses is checked by roentgenograms at 3 and 6 months, at which time nonclosure (which would result in deformity) may be noted and corrected.

Results cannot be evaluated until skeletal maturity is reached. Twenty-one cases are analyzed and evaluated on the basis of a percentage gain on the discrepancy originally present. Twenty-eight per cent of the patients had a gain of 75 to 100 per cent, 47 per cent had a 25 to 75 per cent gain, and 5 per cent of the patients had a less than 25 per cent gain. The error in this group was conservatism, which can be avoided by overcoming the reluctance to operate at an early age when the discrepancy is great. The arrest of epiphyseal growth is a surgical aid to be employed in growing children for discrepancies in leg length. FRANCES E. BRENNECKE, M.D.

Poyner, H.: Immediate Repair of Severed Tendons, with End Results in 140 Cases. *Texas J. M.*, 1947, 42: 534.

The author presents 140 consecutive cases of severed tendons of only one finger. In 29 cases there was involvement of the flexor tendons, the final result showing some residual disability in 14 patients (48.2%). In 111 cases there was involvement of the extensor tendon. The final result showed some residual disability in 23 patients (20.7%). In practically every case, operation was performed within 4 hours after the injury. That could be done since the majority of the patients were employed in factories having first aid stations. As early as 6 hours after the accident there is danger of infection, and no attempt at immediate repair should be made after this period unless the wound received an adequate first treatment. To make the correct diagnosis, the fingers are examined carefully and at the same time the nerve function is checked. The author mentions some of the advantages of immediate repair over secondary repair, and gives a description of his own technique.

After the first cleansing with benzene to get rid of greasy dirt, if present, the hand is scrubbed (with a soft brush and soap) for 10 minutes under running water. The author uses either nerve block anesthesia at the elbow, or general anesthesia. A complete description of his technique for nerve block is given. A blood pressure cuff is used to check the bleeding. Careful débridement and a perfect hemostasis are essential. If possible, the additional incision which is made to locate the ends of the severed tendons should be parallel to the flexion crease and on the anterolateral or dorsolateral aspects of the fingers. If both flexor tendons have been severed, the author repairs the sublimis and the profundus at the same time. The exposed suture material is then placed on the palmar aspect of the sublimis tendon and on the dorsal aspect of the profundus tendon. Here, early motion is permitted because the traction is around the bundle of the tendon. Active exercise is started on the day following operation.

GEORGES E. CLOUTIER, M.D.

MacAusland, W. R.: Arthroplasty of the Elbow. *N. England J. M.*, 1947, 236: 97.

The author describes the following technique of arthroplasty of the elbow which gives almost routinely satisfactory results.

A useful motion of the elbow must range from at least 45 degrees of flexion to 170 degrees of extension. The range of motion, the stability, and the control of the elbow joint are important in evaluating results.

Conditions of purely traumatic origin in patients between 19 and 45 years of age lend themselves best to arthroplasty. The contraindication is in tuberculous involvement of the joint, and all surrounding tissues should be in good condition.

The operative technique is well described. The approach is on the posterior aspect of the elbow, and special attention is given the ulnar nerve. The olecranon is chiseled transversely; the joint surfaces are separated by means of chisels, and are remodeled. A flap of fascia lata removed from the thigh is wrapped around the newly formed humeral condyles.

The postoperative treatment is important, and the final result in more than 100 ankylosed elbows was excellent. GEORGES E. CLOUTIER, M.D.

Cagnoli, H.: The Treatment of Pseudarthrosis of the Carpal Scaphoid (El tratamiento de la pseudo-artrosis del escafoides carpiano). *Bol. Soc. cir. Uraguay*, 1946, 17: 191.

Observations by the author, covering a 5 year period, have shown that 20 per cent of all the traumatic lesions of the scaphoid were pseudarthroses. Forty-six cases presented this condition and 33 were treated surgically. The pathological etiology was considered to be either vascular or mechanical. Interruption of one of the two vessels supplying the scaphoid resulted in a necrobiotic process which produced a pseudarthrosis by preventing union. The mechanical causes are improper reduction and insufficient immobilization.

Beck's method of perforation is indicated in cases of nonunion, or in those cases of pseudarthrosis which appear soon after the time of fracture. Untreated fractures of 3 or 4 months' duration in which there are no displacements of fragments or no malacic changes may also be treated by this method.

Whenever the pseudarthrosis is simple, without arthritic changes at the scaphoid articulation, bone transplantation is the treatment of choice. Although chronic arthritis is a contraindication to bone transplantation, this treatment is indicated in nonadvanced bone necrosis or malacic lesions.

Displacement of the fragments is an indication for removal of the scaphoid, and when scaphoid arthrosis is present this bone must be removed totally, for its presence augments the development of chronic arthritis, while its removal delays the evolution of degenerative changes. Advanced malacia, advanced lysis of the scaphoid fragments, or nonreduction of the fracture indicates the necessity for removal of this bone.

Chronic arthritis deformans, if well advanced, should be treated surgically to produce ankylosis of the wrist, with resection of the distal end of the ulna to permit pronation and supination.

ARTHUR F. CIPOLLA, M.D.

Hampton, O. P., Jr.: The Management of Penetrating Wounds and Suppurative Arthritis of the Knee Joint in the Mediterranean Theater of Operations. *J. Bone Surg.*, 1946, 28: 659.

Penetrating wounds of the knee joint, with the resulting suppurative arthritis, are among the most serious of all war wounds. Experience in wars previous to World War II shows that loss of limb was a common result, and loss of life, frequent. In World War I the death rate from these wounds varied from 8 per cent to 1.8 per cent.

Previous to the invasion of North Africa, several authorities had advocated débridement with removal of foreign bodies and loose fragments of bone and cartilage, with closure of the synovial membrane, if the case was seen early. After a period of 24 hours or less, it was believed that drainage had to be established. Sulfanilamide powder was often placed in the joint. The Willems treatment had been largely abandoned. A few authorities recommended aspiration, and some advocated lavage with closure of the joint, in septic arthritis.

Excision of the knee joint in cases in which sepsis was well established was freely practiced in World War I and in the early stages of World War II, especially by the French, because the joint appeared doomed in such cases, and resection was successful as a means of saving the limb and the life of the patient.

In 1943, during the Tunisian, Sicilian and early Italian campaigns, it was found that suppurative arthritis was rare following penetrating injuries without bone or cartilage damage, or in cases in which the bone or cartilage injuries were minimal. If the synovial membrane was left open the healing was slow,

and subsequent joint function was impaired beyond what would have been expected from the wound damage. In some cases in which the bone and joint damage was not extensive, there was lingering sepsis and slow joint destruction. In cases in which there was extensive bone and cartilage destruction by the original trauma, severe septic arthritis was the rule. Fortunately only a few amputations were necessary, but the joints were permanently destroyed.

The program which was laid down in 1944 for the management of all knee joint wounds, penetrating or perforating, regardless of the time which had elapsed since the wound was received, was as follows:

In the forward area, after preparation by transfusion of blood or plasma, the joint was thoroughly opened, and foreign bodies and other material were removed. Loose bone chips, loose cartilage, and damaged menisci were excised. Defects in condyles were trimmed evenly and comminuted patellae were usually removed. The joint cavity was thoroughly irrigated. The synovial membrane, and at times the capsule, was closed, and 10,000 to 20,000 units of penicillin were instilled into the joint. When insufficient soft tissue remained to close the joint, a skin or fascia flap was mobilized to cover the defect. If damage was so extensive that closure could not be achieved, and the joint was considered hopeless, excision of the remaining joint cartilage was advisable. Immobilization was accomplished by a single hip spica or a Tobruk splint. Systemic penicillin was continued. From 24 to 48 hours following the surgery, the joint was aspirated and irrigated, and filled with penicillin by means of a large needle.

In the base hospital, 4 to 6 days after the wound had been received, reparative surgery was done. The joint was again aspirated, irrigated, and filled with penicillin, and the remaining open wound was closed. If doubt existed as to the proper treatment in the forward area, the joint was reopened and examined.

In 10 to 14 days after the wound had been sutured, immobilization was discontinued and active motion begun, with the limb in balanced suspension in a Thomas splint with the Pearson attachment. Signs of sepsis within the joint were treated either by reoperation with thorough cleansing of the dead tissue and blood clots, or were repeatedly aspirated, irrigated, and filled with penicillin.

If hope of a functioning joint had to be abandoned, radical resection of the joint was preferable to open drainage.

Hampton presents data from several series of cases to show the marked improvement in results when this program was followed. In one large series the incidence of sepsis dropped from 27.4 to 5.1 per cent. Eight very interesting and convincing cases are presented in detail, with roentgenograms and photographs.

Among the conclusions drawn by the author is the decision that continuous drainage of fluid from the knee joints is not adequate surgical treatment in cases of suppurative arthritis and is not indicated. He believes that knee-joint resection has a definite place in the management of severe wounds and sepsis in military surgery. NEWTON C. MEAD, M.D.

Ottolenghi, C. E., and Del Sel, J. M.: Anterior Arthrodesis of the Instep (La artrodesis anterior de la garganta del pie). *Rev. As. méd. argent.*, 1946, 60: 630.

Anterior arthrodesis of the instep is a simple procedure and when done with the correct technique, satisfactory results are assured.

The author reports 53 such operations. The indications included (1) alteration of form because of deformity from traumatic, infectious gonorrheal, or tuberculous arthritis, or fractures of the malleolus, astragalus, or the leg: (2) alteration of function because of central or peripheral paralysis, such as from poliomyelitis, or from paralysis of the sciatic nerve or some of its branches.

The arrangement of the graft is either intra-articular, para-articular, or extra-articular for slipping, with or without resection of the articular surface or for inversion. STEPHEN A. ZIEMAN, M.D.

Gui, L.: Disarticulation of the Tarsometatarsal Joint of the Lisfranc Type (La disarticolazione tarso-metatarsica di Lisfranc). *Chir. org. movim.*, 1946, 30: 28.

The author reports 373 disarticulations of the tarsometatarsal joint in a total of 300 patients which were done in a period of 31 months, from April, 1941 to January, 1944.

The Lisfranc amputation has fallen into some disrepute in the past because of the fact that the muscle balance was disturbed, the patient no longer walked well, and before long he developed pressure sores where abnormal weight bearing occurred.

The technique used in the 373 cases was a modification of the Lisfranc operation perfected by Scaglietti. This modification consisted of transplanting the tibialis anterior tendon and the extensor hallicis longus tendon into the center of the disarticulation so that a movement of extension could be made and any movement of supination of the foot could be prevented, and a slight amount of pronation of the foot would be produced so that the whole plantar surface of the extremity would come in contact with the ground on weight bearing.

The large number of cases were the result primarily of frostbite during mountainous warfare. The operative procedure recommended by the author is the removal of the cartilaginous portion of the distal tarsal bones and then smoothing down the bones well by the use of a file so that there are no rough protruding spicules of bone. Then the tibialis anticus and the extensor hallicis longus tendon are firmly sutured between the second and third cuneiform bone with the tendon of the peroneus longus. This gives a good stable attachment and the foot can be brought into direct contact with the ground in walking. The inability to do this has been the one great criticism of the Lisfranc operation in the past. The plantar skin and subcutaneous tissues are utilized so

that no weight is placed on the thin dorsal skin and subcutaneous tissues. The suture line is always made on the dorsal surface of the foot.

Postoperatively, the author recommends the insertion of a drain for a short period of time and the immobilization of the extremity in a plaster cast which extends from the middle third of the thigh down to the tip of the foot with the knee bent to 125 degrees and the foot at a right angle with a slight amount of pronation.

In this series of cases there was 1 death from a pulmonary embolus. In 5 patients with postoperative hemorrhage another operation with ligation of the bleeding vessels was necessary.

CARLO SCUDERI, M.D.

FRACTURES AND DISLOCATIONS

Suire, P., and Thobois, P.: The Treatment of Fractures of the Clavicle by Internal Splinting with Kirschner Wire (Sur l'embrochage par broche de Kirschner dans le traitement des fractures de la clavicule). *Lyon chir.*, 1946, 41: 552.

There are numerous methods used for the repair of fractures of the clavicle with displacement, but none is entirely satisfactory. All of them make daily inspection of the position of the fragments and of the condition of the apparatus necessary. This is difficult in a hospital and nearly impossible in private practice. It is hard to immobilize the shoulder and sternoclavicular joints, and there is danger of compression of the nerves and vessels in the axilla. None of the appliances thus far devised are comfortable nor do they preserve reduction of the fragments of the clavicle.

Internal splinting makes all of these considerations unnecessary. It maintains reduction by giving the bone its natural curve. This is also true in multiple fractures of the clavicle. The wire is firmly anchored in the principal fragments.

This procedure is based on the work of Kuntschner in the intramedullary nailing of long bones. However, the conditions encountered in pinning of the clavicle are somewhat different from those encountered in nailing of the bones of the extremities. The clavicle is cancellous on the medial and lateral ends; therefore the pinning is intramedullary only in the midportion of the bone. The location of the skin incision also presents a problem different from that in nailing of the bones of the arms and legs. Goddard does not use any incision at all. Rocher states that manual external reduction is unsatisfactory and that an incision is necessary. Sicard uses an incision only in multiple fractures of the clavicle. Pinning of the clavicle under constant x-ray control, so easily done in the extremities, is impossible because the clavicle cannot be viewed from various angles by means of x-rays. This is one important reason why an incision is necessary. Fractures of the clavicle are often badly displaced, and reduction by external means alone is very difficult. Even in the absence of severe displacement, reduction of fractures of the lateral portion of the clavicle by using the arm as a lever is impossible because of the conoid and trapezoid ligaments. Often the roentgenogram fails to reveal all the fragments in a severely comminuted fracture. Manipulation often causes the skin over the clavicle to be pierced by one of the sharp obscure fragments.

It is also important to protect the underlying large vessels and nerves, and much safer to make an incision and discard all esthetic objections.

The technique of pinning has to be adjusted to the site of the fracture. Rocher inserts the Kirschner wire through a prepared opening at the medial end of the clavicle. The clavicle has the shape of an "S". It seems to be very difficult to predetermine the direction of the opening at the medial end of the clavicle for every type of fracture of the clavicle. If the opening is incorrect the wire abuts against the inner wall of the cortex and does not enter the lateral fragment. Also, the wire may slide along the inner wall of the cortex and impact against the outer fragment.

Insertion of the wire through the dorsal aspect of the clavicle seems to be the best method. The Kirschner wire inserted through a small skin incision should enter the outer fragment in cases of fracture of the medial third and in certain fractures of the middle third of the clavicle. It should enter the medial fragment in fractures of the outer third and in most fractures of the middle third.

Descriptions and diagrams are presented to illustrate a few technical details in 3 typical fractures of the clavicle.

The patient is generally allowed to move his shoulder and elbow on the next day. The wire is removed on the twenty-fifth day.

The author states that he found that fractures of the clavicle treated with internal fixation heal more slowly than those treated by manipulation and external immobilization. No explanation of this observation is offered. It is suggested that the play which the fragments have around the wire or the presence of a foreign body may be responsible for the slow union.

GEORGE I. REISS, M.D.

Hauser, E. D. W.: Special Techniques for Unusual Fractures of the Forearm. *Q. Bull. Northwest. Univ. M. School*, 1947, 21: 18.

The author presents a number of cases of difficult fractures of the forearm illustrating the principles of treatment with varied techniques.

In compound fractures, in addition to the usual methods employed in cleansing the skin and the would itself, he used emusol, a cationic detergent, to cleanse the skin, and repeatedly washed the wound with a 1:3,000 aqueous solution of zephiran chloride.

When malunion could be corrected by osteotomy, he used drill openings connected with an osteotome until the bone could be bent. In other words, the result was similar to that when the brushes of two brooms interlock.

The author's fourth case presents an interesting problem. The patient was an 8 year old child who

had a marked ulnar deviation of the hand, caused by cessation or, at least, a slowing down of growth at the distal ulnar epiphysis following the application of radium to a strawberry nevus at the wrist at the age of a year. The distal ulna, including the cartilaginous epiphysis which contains two centers of ossification, was split longitudinally and a tibial graft was wedged in place in the cleft. Union occurred and led to correction of the ulnar deviation of the hand.

The author prefers external fixation of compound fractures when possible, but was forced to use plates at times. VERNON C. TURNER, M.D.

Howorth, M. B.: Congenital Dislocation of the Hip. *Ann. Surg.*, 1947, 125: 216.

The cause of congenital dislocation of the hip is still vague. Both the anatomical and embryological explanations have been few and far between. The authors have made an extensive study on 15 normal fetuses of which the ages ranged from 10 weeks to full term. Dissections, roentgenograms, and serial sections were made to make a comparative analysis of the embryological anatomy of the fetuses 10 weeks, 3, 4, 5, and 6 months old, respectively. The lengths of the femurs varied between 2 and 8 cm.

The youngest femoral specimen (10 weeks old) measured 2 cm. The muscles and tendons of the hip and thigh were not differentiated from each other. Rather than an individual muscle, one observed a pale homogeneous mass. However, the gross appearance of the capsule, and the femoral and acetabular articulation was comparable to that of a fully developed fetus or adult hip. The femoral head and acetabulum measured 5 mm. in diameter and were covered by cartilage. The capsular apparatus was well developed and provided firm stability to the hip joint. The angle between the neck and shaft of the femur averaged 140 degrees.

All of the hips in fetuses 3 months old or older, disclosed a similar developmental pattern. Muscles differentiated from each other, blood vessels and nerves were discernible, and there was a normal cartilaginous lip along the posterosuperior half of the margin of the acetabulum. With the exception of limited 145 degree motion in extension, the function of the thigh approached normal values.

In another group of hips (8) studied by the author the only variations worthy of note were that: (1) the tendons could be distinguished from their muscles, (2) the thigh extension was limited to 160 degrees, (3) the labrum glenoidale was well developed, and (4) the haversian gland was well developed.

Despite the splendid research work done by the author, no appreciable advance in our knowledge concerning congenital dislocation of the hip has emanated from this study. For instance, nothing has been learned relative to its great preponderance in the female. Workers at the Rockefeller Institute are alleged to have observed congenital dislocation in rabbits; it is hereditary in this species and can be inbred.

The author's study is based on 185 cases of congenital hips. His findings were as follows:

In all but a few cases the femoral head was dislocated outward, upward, and forward, with the capsule and rectus tendon greatly elongated; the capsular apparatus was thickened. Contrary to the textbook dicta, the capsule was not always hourglass in shape. There was uniform limited adduction, due mostly to contraction of the adductor muscle. The posterior dislocation of the hip was limited to the older group of patients. Because of muscle contraction (anterolateral group) with adherence of the capsule to the ilium and flattening of the anterior acetabular hip margin, much resistance was offered in telescoping the hip from the ilium. The gracilis and adductor longus were the principal offenders. The remaining adductors and the hamstring group of muscles rarely participated in the immobility of the congenital hip. The acetabulum was not only shallow but was generally occupied by the haversian gland, which in the majority of cases would prevent reposition of the femoral head unless the surgeon gouged out the copious acetabular debris. It was further noted that the haversian gland often replaced the acetabular cartilage as a fibrous obliterated mass. The ligamentum teres was elongated, hypertrophied, frayed, or absent.

In half the cases the acetabulum was not deep enough to accommodate the femoral head. In a smaller percentage of cases, the head was much greater than the acetabulum. Some of the heads were flattened medially, which precluded adequate reduction without surgical interference.

Closed reduction is the treatment of choice in infants under a year of age. The traumatizing procedure of Lorenz should be abandoned. The Hibbs procedure, according to the author, is far more advantageous. Immobilization to 90 degrees of flexion and abduction is recommended for from 3 to 6 months. Walking is permitted 2 months after the completion of reduction.

Preliminary skeletal traction combined with tenotomy of the gracilis and the adductor longus is far superior to the brutal tearing of such muscles in the older group of children. Open reduction, in capable hands, is the treatment of choice in the older group.

The author prefers a Smith-Petersen type of incision. The capsule is incised anteriorly, but cutting it superiorly is avoided. The hypertrophied haversian gland and fibrous tissue is gouged out from the acetabulum. Any adhesions between the capsule and ilium are released. Correction of the anteversion is sometimes indicated; it can be obtained by supracondylar transverse osteotomy. Immobilization in a plaster of Paris cast for 6 weeks is recommended, care being taken not to precipitate a coxa plana.

Shelf stabilization is reserved for children over 10 years of age or older. The procedure advocated is the Gill method, which has been extremely efficacious in the irreducible congenital dislocations. Here, too, preliminary traction is of paramount importance.

Cup arthroplasty is indicated for bilateral hip arthopathies, and fusion may be performed in the unilateral and painful arthropathies.

SAMUEL L. GOVERNALE, M.D.

Bosworth, D. M.: Fracture Dislocation of the Ankle with Fixed Displacement of the Fibula Behind the Tibia. *J. Bone Surg.*, 1947, 29: 130.

Attention is called to a condition, fracture dislocation of the ankle joint, which probably has escaped recognition by most surgeons. Five cases are presented in which a posterior displacement of the proximal fragment of the fibula behind the tibia prevented accurate closed reduction. Open reduction requires the use of a pry pin between the tibia and fibula and the use of considerable force to snap the fibula back into normal position. Following this, anatomical reduction of the ankle has been easy.

This situation arises as follows: the intact fibula is pulled back behind the tibia by the lateral collateral ligaments. Continuation of the force rotating the talus backward and out from its position beneath the tibia causes further force on the collateral ligaments, and, finally, the fibula is broken off against the posterior tibial border. With this fracture there is nothing left attached to the upper fragment with which it can be pulled back into place.

Most ankle fractures do not have a posterior displacement of the fibular shaft because the malleolus is broken by pressure against the lateral surface of the tibia.

The diagnosis of posterior fixation of the fibula by means of roentgenograms may be missed since one may believe that the view taken is not truly lateral. In a true lateral view the fibula does not lie posteriorly but is superimposed on the center of the tibia.

VERNON C. TURNER, M.D.

Magee, R. K.: The Kuntscher Method of Pin Fixation. *Canad. M. Ass. J.*, 1947, 56: 65.

The Kuntscher method of pin fixation was popularized by its use at the Kiel German Naval Hospital, and was first reported in March, 1940.

The author studied 20 cases in which this method was used, at the Clinic of Professor J. F. Nuboer, in Utrecht, Netherlands. The principle is the same as that of the Smith-Petersen pin fixation for femoral neck fractures, i.e., axial intramedullary fixation, by large cannulated stainless steel rods, of fractures of shafts of the long bones. The pins range from 7 to 11 millimeters in diameter, and vary in length. The width of the medullary canal is measured by means of a roentgenogram of the bone taken at a distance of one meter from the x-ray tube. The next smaller pin is used so that it can be inserted more readily and yet held firmly. The longitudinal fluting prevents rotation. Pins for femurs are straight; those for tibias are slightly curved and have split, flared lower ends to engage in the wide lower tibial medulla Pins and other instruments are illustrated, as well as a patient prepared, side-lying, on a Hawley table.

The ideal case for this procedure is a transverse fracture of the mid-shaft, or of the upper one-third of the femur, or the upper half of the tibia. The technique of a femoral pin insertion by the closed and open method is described in detail. Closed reduction is carried out under strict fluoroscopic control. Epidural block anesthesia is preferred in Professor Nuboer's Clinic. There was no shock at all in the cases observed. No external fixation was used for femurs. Active motion of the knee and of the hip is encouraged in 2 or 3 days after surgery. Patients with transverse fractures are up on crutches in 2 to 3 weeks, and patients with other types of fracture are up when x-rays show adequate callus.

Unusually large fusiform callus is often demonstrable in roentgenogram, in 2 to 3 weeks. Whether impaction or the extrusion of marrow substance into the fracture site is responsible for this response is not known. Pins are removed in from 3 to 4 months, or later in cases of pseudarthrosis.

The tibial pin is inserted through an oblique window in the upper inner cortex, and the pins flare on the lower end to hold in the widened distal medullary canal. A plaster cast from groin to toes is used to prevent rotation. The method has been used for fractures of the humerus, ulna, and radius.

Several cases are presented, with roentgenograms. All patients were young adults in whom rapid solid union was obtained. The first case in America in which the Kuntscher method was used is described.

Even in open reduction there is little disturbance of the soft tissues, as periosteal stripping is avoided. Infection is not likely if compound fractures are not included, as in the group studied, the procedure was carried out without the protection of penicillin. Occasionally a pin may break or a ring sequestra may develop. The exposure to radiation of the assistant who reduces the fracture under fluoroscopic control is a hazard. The technique is detailed, and demands facilities and teamwork available only in a fracture center, but has advantages over other methods in upper femoral fractures.

FRANCES E. BRENNECKE, M.D.

ORTHOPEDICS IN GENERAL

Zawisch, C.: Marble Bone Disease; A Study of Osteogenesis. *Arch. Path.*, Chic., 1947, 43: 55.

Marble bone disease is commonly known as Albers-Schoenberg disease, osteopetrosis, or osteosclerosis fragilitas generalisata. The disease is due to the influence of an unknown agent which damages the bone forming blastema at the beginning of the second period of development of each bone. From this time on, the differentiation of bone tissue is retarded and the less differentiated types become hyperblastic. The malformation is responsible for the general retardation of resorption, because the two phases of the bone forming process—deposition and resorption—stimulate each other.

The basis for the author's study was an infant, 11 months old. Detailed description of the microscopic findings is given, which outlines the findings in the various periods of bone growth. From this it was concluded that in marble bone disease the threshold of response to stimuli which bring about resorption is raised. Resorption is arrested at the beginning of the second period for a long time. The results are the

Fig. 1 (Zawisch). Marble bone rib, part of a longitudinal section. Note the epiphyseal line and the densely packed spongiosa. To the left, cortex and periosteum. Azan-Mallory stain; ×50.

fetal size and shape of the marrow cavity, a thick cortex composed of all the embryonic strata which normally are removed, and an unusual amount of spongiosa. In the finer histologic structures it was found that the osteoblasts everywhere were so flat that they were hardly distinguishable.

Despite conflicting statements in the literature it was the feeling of the author that osteoclasts are present in all stages of their evolution. The absorption front of the cartilage is normal, but the succeeding endochondral ossification is pathological from the beginning. Normally, the first period stage, in which no endochondral bone is formed, is being repeated as long as the bone grows. The capillaries which absorb the cartilage always keep ahead of the osteoblasts, and deposition of bone begins at a certain distance from the absorption front. Thus, the capillaries have time to absorb a certain amount of cartilaginous ground substance. As soon as a cartilage cell is liberated by the absorption of its walls, basophilic matter and an osseous globule are deposited in the cavity.

Endosteal ossification in marble bone disease shows the same pathologic development as cortical ossification. A hyperplastic production of less differentiated bone tissue, containing more basophilic matter than usual, is at the root of the evil.

There is no doubt that many patients with marble bone disease show recessive heredity, but others do not.

Clubbing of the ends of long bones is the result of the hyperplasia and persistence of less differentiated types of bone tissue in the metaphyses. Those metaphyses which grow most rapidly are more readily afflicted. Histochemical methods have not been used up to now, and the general ash contents have not been analyzed except by Clifton, Frank, and Freeman, who made use of a biopsy fragment for this purpose. They showed that the spongiosa has a higher ash content than the cortex. Those types of tissue, e.g., chondroid bone and the basophilic inclusions, which even normally do not contain fibrils, are hyperplastic in marble bones, and this increases the absolute amount of calcium. The spongiosa is richer in basophilic inclusions than the compacta. The greater density of marble bones in the reontgenogram is due partly to a greater density of structure when the bones are in a state of repair (eburnation) and partly to a higher calcium content, revealed indirectly by the scarcity of fibrils in all the types of bone tissue involved.

Polarized light reveals a relative scarcity of fibrils in all the bone tissues. Chondroid bone of the type which is hyperplastic in marble bone does not contain fibrils even normally, and the pathologic change in the ground substance consists merely in an increase of basophilia. In the other bone tissues the scarcity of fibrils is very conspicuous. The anemia in marble bone disease may be due to the same agent which impairs the differentiation of bone tissue.

C. Fred Goeringer, M.D.

Copeman, W. S. C., and Ackerman, W. L.: Edema or Herniations of Fat Lobules as a Cause of Lumbar and Gluteal "Fibrositis." *Arch. Int. M.*, 1947, 79: 22.

Edema, herniation, and strangulation of fat lobules are postulated by the authors as the true cause of fibrositis, or painful back. Biopsy material has not substantiated any pathologic evidence that fibrositis exists per se. On the other hand, each of the 11 cases presented exhibited fibrofatty deposits at the painful point and extirpation resulted in an apparent cure of the syndrome.

The authors' classification of the herniated fatty tumors is as follows: (1) pedunculated, (2) nonpedunculated, and (3) the foraminal type. The last develops from one of the three segmental lumbar nerves or vessels. All tumefactions can become severely compressed or contused (by trauma) between the deep and superficial lumbosacral and gluteal fascia. Demonstrable hyperemia coupled with edema of the excised tumor has convinced the authors that they are dealing with a definite clinical entity which in their experience, when subjected to surgery, was permanently cured.

Furthermore, it is to be remembered that whereas these tumors have been treated heretofore by novocaine injection, the cure has been questionable. If it is true that the fat tumor is accompanied by a nerve trunk, injections will not relieve the pressure.

Interestingly enough, the surgical approach is performed under local block. Digital pressure is exerted on the herniated fat tumor until the patient involuntarily winces (trigger point pain). The offending mass is not removed alone, but all surrounding fat is disintegrated by destruction of its septae.

In the brief period of postoperative observation, it was noted that no recurrences had appeared in any of the 11 cases.

The authors have also studied and dissected 14 cadavers. SAMUEL L. GOVERNALE, M.D.

Kessler, H. H.: Rehabilitation of the Arm Amputee. *Plast. Reconstr. Surg.*, 1947, 2: 1.

During the 4 years of World War II, 17,000 service men lost their limbs as a result of war wounds and operative injuries. During the same period 120,000 civilians lost their limbs from accidental injuries and disease. Of both groups approximately a third were arm amputees.

There are two primary requirements that a prosthesis must fulfill if it is to meet the needs of an arm amputee, that of dress and that of utility for the routine pursuits of life. To date there has been no one prosthetic device that satisfies these requirements. The functions of the upper extremity are so intricate and complex that they cannot be duplicated; they can only be imitated. Furthermore, the one function that the amputee misses above all else is tactile sensation.

In a survey of 9,000 arm amputees in Germany, 60 per cent preferred the arm prosthesis for dress alone. Made of wood, leather, plastic, latex, or felt, it can be made comparatively light, and in some cases even sufficiently artistic to duplicate the natural appearance of the normal hand.

It is impossible to duplicate the combinations of hand and finger function. However, there are four simple functions which are important and can be duplicated mechanically. They are forceps action, pliers action, ring action, and hook action. These functions can be obtained by the standard type of utility hook which is held closed by a heavy rubber band and opened by the action of a loop around the opposite shoulder which pulls on a lanyard attached to an outrigger on the hook. Closure of the hook is accomplished by the simple release of the pull on the lanyard, the hook closing by the action of the elastic band. While the amputee can exercise considerable ability in the handling of routine tasks, the hook does not hold soft objects, such as a cigarette or a doughnut, satisfactorily.

In the cineplastic procedure the muscles that remain in the stump are canalized and attached to a system of levers so that the flexors and extensors in the forearm and the biceps and triceps in the upper arm activate the artificial hand and arm. The great advantage of this method is the natural and physiological action, the simplicity of the mechanical device, the effortless control, and the avoidance of straps, loops, and harness to the opposite shoulder for below the elbow arms. However, the principle had its limitations in application to the needs of factory workers, farmers, and laborers who required a prosthesis that could exercise considerable force.

The scope of cineplasty can now be extended to more varied and energetic physical demands through the development of a utility hook operated by cineplastic motors and interchangeable with a cineplastic hand. This has been accomplished by the development of an ingenious spring coupling which permits interchangeable action of the hand and hook by the cineplastic motors.

Fig. 1 (Kessler). Cineplastic prosthesis for upper arm amputee.

In addition to cineplasty, other special methods are available to the amputee to meet his special needs. The Krukenberg operation is one of these methods. It consists of the splitting of the forearm into two fingers so that the approximation of the two digits provides prehension while the natural skin innervation permits normal tactile sensation. The method has been very popular in Germany and Russia. In the United States where public prejudice exists toward the appearance of the stump there has been a natural reluctance to undertake this measure. It is a valuable procedure for the bilateral amputee since he requires no prosthesis. It is of especial value for the blind bilateral arm amputee.

In the rehabilitation of the arm amputee a five point program is required: the psychological preparation of the patient, the selection of adequate surgical methods which will give him a painless and satisfactory stump, the aftercare of the stump, the selection of the device or special surgical procedure which will permit him to wear a prosthesis, and, finally, the training of the amputee in the use of the prosthesis. C. FRED GOERINGER, M.D.

Magee, R. K.: Sauerbruch Cineplastic Amputation. *Lancet*, Lond., 1946, 2: 904.

The author indicates that the cineplastic amputation as developed by Sauerbruch appears to have the advantage of permitting more dexterous movements under more normal muscle control than the usual prosthesis. Amputees at Sauerbruch's clinic demonstrated that they could write with normal legibility and could pick up a map with forceps or with the hand, pick out a cigarette and light it, and attend to their clothes. This type of amputation is applicable only to the upper limb and is best chosen for bilateral cases. The shortest stump in the forearm in which it may be used is 7 or 8 cm.

from the anterior elbow crease. There must be a movable scar at the end of the bones, in as much as the degree of up and down movement of the ivory pins determines the extent of opening and closing of the hand that will result. The pin is passed through a skin lined tunnel and it is connected by a chain to a bar from the lower end of which a metal rod goes to the hand mechanism. One side of the mechanism is the thumb and the other the index finger and the remainder of the hand. In instances in which the terminal scar is fixed, reamputation must be performed. The bones are divided 3 cm. shorter than the muscles, and the deep fascia, but not the muscles, is sutured over the end of the bones to give a free scar. From 5 to 10 days later active exercises and massage are instituted. Constant practice is a requisite.

The tunnels are made under local anesthesia so that the best muscle groups may be selected for the tunnel.

An area of about 3 finger breadths, or about 5 by 5 sq. cm. is mapped out about 5 cm. from the end of the stump. Three sides of this square are freed to form a flap with its base either on the medial or on the lateral side. The flap consists of skin and subcutaneous tissue including the deep fascia formed into a tube with the skin surface on the inside.

A blunt pointed muscle dilator is passed through the muscle fibers along a tract about 1 cm. deep, only a thin layer of muscle fibers being picked up. The tube of skin is then passed through this tunnel in the muscle and is fixed with three sutures to the skin edge of the side opposite the base of the tube. A Thiersch skin graft is cut and sutured in place over the remaining raw area.

The first dressing is done in 10 days. Then the pins, from 5 to 10 cm. in diameter, are inserted. Exercises are maintained, and in about 3 months an artificial limb is fitted.

The prosthesis. The artificial limbs are of light aluminum covered with leather. There are windows where the pins emerge to be attached to a metal loop at each end. In the forearm, contraction of the flexor group opens the hand, and contraction of the extensor group closes the hand. In the upper arm, contraction of the biceps closes the hand, and contraction of the triceps opens the hand; a strap from the ipsilateral shoulder pronates the hand, and the spring supinates it again; a strap from the contralateral shoulder flexes the elbow, and gravity extends the elbow. There are locking devices, easily manipulated by buttons on the outside, that lock the elbow in a fixed position and the forearm in a fixed position of rotation, if desired; and there is one at the wrist that locks the hand grip. A pencil may be grasped between the thumb and opposing hand and by locking the hand mechanism the grip is maintained without muscle effort. The hand can close further but cannot open.

C. Fred Goeringer, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Hodges, H. H., and Freeman, N. E.: Thrombophlebitis on the Medical Service of a General Hospital. *Am. J. M. Sc.*, 1947, 213: 226.

The subject of thrombophlebitis and embolism has received increased attention in the surgical literature during recent years. The authors had occasion to study 10 instances of thrombophlebitis occurring in 9 patients, all of whom were American soldiers. They discussed the diagnosis and divided the cases into (1) thrombophlebitis limited to the calf veins, (2) thrombophlebitis limited to the calf and femoral veins, and (3) iliofemoral thrombophlebitis. They discuss their treatment and results and summarize as follows:

Ten instances of thrombophlebitis in the lower extremity were observed on the Medical Service of a General Hospital during a 4 month period.

Eight of these cases developed in patients with scrub typhus fever.

Early diagnosis was not achieved until they began to look carefully for the early signs.

In the authors' opinion, treatment of thrombophlebitis should be individualized according to the location and extent of the lesion.

a. Thrombophlebitis confined to the calf veins was treated by lumbar paravertebral sympathetic block with uniformly good results. This procedure probably tends to prevent central propagation of the thrombus. Embolism did not occur, and the patients were spared the prolonged disability which follows ligation of the femoral vein. The use of heparin or dicoumarin in these cases might help prevent propagation of the thrombosis. However, its use is usually unnecessary. The concomitant use of anticoagulant and lumbar sympathetic block is prohibited by the danger of retroperitoneal hemorrhage.

b. Thrombophlebitis involving the calf and femoral veins was treated by proximal ligation. Sympathetic block was used only for relief of the pain after ligation. In 1 case of thrombosis of the calf vein with extension into the femoral vein, paravertebral procaine block prior to femoral ligation was followed promptly by pulmonary embolism.

c. Iliofemoral thrombophlebitis was treated with heparin, high ligation being inadvisable in these sick patients. The results were satisfactory.

This choice of therapeutic methods for the treatment of specific thrombotic lesions seems rational. It has been successful thus far in preventing embolism and in minimizing disability.

In addition to these specific measures, all three groups of patients were treated by elevation of the extremity, administration of a compression bandage, bed exercises, and early mobilization.

The authors' observations suggest that all cases of iliofemoral thrombophlebitis do not necessarily result from extension of a thrombosis of the calf vein; such a process may originate occasionally in the iliofemoral region. PAUL MERRELL, M.D.

Blalock, A.: The Use of Shunt or By-Pass Operations in the Treatment of Certain Circulatory Disorders, Including Portal Hypertension and Pulmonic Stenosis. *Ann. Surg.*, 1947, 125: 129.

The purpose of this article was to discuss certain abnormalities of the circulatory system in which treatment by shunt or by-pass operations is proving effective or may be found to be useful. Particular emphasis has been placed on the treatment of portal hypertension and pulmonic stenosis.

Before the discussion of the individual disorders, some general remarks pertaining to blood vessel anastomosis were made. It is most important that the anastomosis shall remain patent. This is dependent to a considerable extent upon the caliber of the vessels that are used and upon the expertness with which the anastomosis is performed. The anastomoses most apt to remain patent are those in which there is the greatest difference in pressure on the two sides of the union. It is probable that the anastomosis of a systemic artery to a vein would be most likely to remain patent, that of a systemic artery to a pulmonary artery would rank next, of an artery to another systemic artery would rank third, and a vein-to-vein anastomosis would be least apt to remain open.

A vein-to-vein anastomosis is more apt to remain patent when the suture method is used as compared with the nonsuture method employing the vitallium tube. In the anastomosis of large arteries, such as the aorta, the author is of the opinion that the suture should be an everting one and should include the entire thickness of the wall of the aorta. In many cases only an end-to-end suture is feasible, in others an end-to-end anastomosis may be done, as for example, the end of the splenic vein to the side of the renal vein. It was found that 90 per cent of the splenorenal anastomoses remained patent when the end-to-side method was used, whereas only 73 per cent of the end-to-end anastomoses remained open.

The author notes that a by-pass or shunt operation should be considered in hypertension of the portal vein or its tributaries. Although it is not always possible to be sure as to the nature of the block, it is usually possible to predict, on the basis of studies of liver function, whether the hypertension is due to portal cirrhosis or to extrahepatic blockage. A discussion is presented relative to information to be gained about the nature of the block from certain clinical observations. Portacaval shunt (anastomosis of the portal vein and inferior vena cava) operations are still in the experimental stage, and much remains to be learned about the choice of patients for operation and the choice of operative pro-

cedure. It does appear, however, that the principle of portacaval shunts in the treatment of ascites and gastrointestinal bleeding is a much sounder one than those of operations previously advocated.

The following impressions which have been gained from the author's experience are presented: (1) anastomosis of the portal vein and inferior vena cava is preferable, when indicated, to a splenorenal union, in that it will conduct more blood and is more apt to remain patent; (2) if a splenorenal anastomosis is performed, suture of the proximal end of the splenic vein to the side of the renal vein is preferable to an end-to-end anastomosis; (3) suture of the divided distal end of the portal vein to the side of the inferior vena cava is preferable to a side-to-side anastomosis since the opening is more apt to remain patent; and (4) it is not necessary to occlude the inferior vena cava completely while performing a portacaval shunt.

A shunt or by-pass operation may be indicated in the treatment of coarctation of the aorta. Other conditions besides that of pulmonic stenosis, in which a shunt or by-pass operation may be used, are briefly mentioned. The splenic artery may be used for conducting blood to the left kidney; the splenic artery may be used as a replacement for the first part of the superior mesenteric artery. The internal mammary vessels, when joined to the mesenteric vessels of a segment of jejunum, may be employed in the creation of an artificial esophagus. In aneurysm of the first part of the common carotid artery, the adjacent subclavian artery may be substituted for the carotid.

In cases of pulmonic stenosis or atresia, the underlying principle in the choice of patients for operation is that there be inadequate flow of blood to the lungs. Although the clinical history may be of some aid, the two outstanding features are that (1) the pulmonary artery is small in size and (2) there is roentgenographic evidence of absence of congestion in the lung fields. A diagnostic method which should be available and which has not been used to the desired extent is that of visualization of the heart and great vessels after the injection of radiopaque substances.

In most instances, the author prefers an end-to-side anastomosis, that is, the union of the end of a systemic artery to the side of one of the two pulmonary arteries. In most patients who are more than 2 years of age the subclavian artery is the vessel of choice. Discussions of the technical features of the operation are presented. Two hundred and forty-three patients who were thought to have the "tetralogy of Fallot" have been operated upon by the author and his associates. The over-all mortality rate has been 21 per cent. The mortality rate in the second 100 patients was 15 per cent. In the patients (approximately 147) in whom an anastomosis between the end of a subclavian artery and the side of the pulmonary artery was performed the mortality rate was 9 per cent. On the other hand, the mortality rate among those in whom the carotid or innominate artery was used (approximately 57) was 33 per cent. It was also noted that because of a long waiting list of patients, those chosen for an early operation were doing rather poorly, but postponement of operation would have been a serious risk. There have been no instances of empyema or mediastinitis in the patients operated upon.

HERBERT F. THURSTON, M.D.

De Takats, G., and Evoy, M. H.: Peripheral Vascular Sclerosis. *J. Am. M. Ass.*, 1947, 133: 441.

Peripheral vascular sclerosis is the overwhelming single cause of deficient arterial circulation in the lower extremities. Four grades of this disease can be recognized. The authors give the data of a series of 57 carefully selected cases and group them according to the severity of the disease.

Group 1. These patients have diminished or absent pulsations of the foot or lower leg. The skin is warm and the color of the feet is normal. They can walk a distance of from 2 to 6 blocks without pain. Lumbar sympathectomy was performed in 18 of such patients. The authors state that the improvement in walking in some of these has been dramatic. These persons have been restored to their full earning capacity. In 2 other patients included in this group there was no improvement in the claudication, although the foot and lower leg became warm and dry. The authors raise the question as to whether claudication can be relieved at all by sympathectomy.

Group 2. The feet of the patients in this group are pulseless, and their ability to walk without pain is reduced to less than 2 blocks. Trophic changes may still be absent, although the feet are cold and dry and a single toe is often cyanotic. A cold and moist foot always gives a better prognosis because such patients exhibit a heightened sympathetic tone, the release of which warms up their skin. Of 22 patients in this series, only 1 required amputation. Sympathectomy helps in that cyanosis may disappear and a pregangrenous leg may be converted into a warm dry extremity.

Group 3. There is pain at rest and intractable ischemic neuritis. Walking may be less painful or even offer relief when rest in bed is difficult. When the foot is ice cold and when arteriolar obstruction and capillary paralysis are obvious from the pronounced dependent rubor, sympathectomy is of no use and may precipitate gangrene. In one form in which the pulseless foot is hot, an osteoporotic and causalgic state exists, and after a satisfactory response to sympathetic block, a sympathectomy has averted amputation.

Group 4. The patients exhibit ulceration and gangrene of the digits or parts of the foot. The lesion is dry and not too painful. The popliteal pulse is absent, and possibly the femoral pulse is also absent. Supracondylar amputation at the level of positive histamine flares used to be the surgical procedure of choice in these patients. However, a sympathetic block may so shift the level of circulatory efficiency that a lower leg or a metatarsal amputation can be tolerated. This is an important group since patients can be discharged with a heel

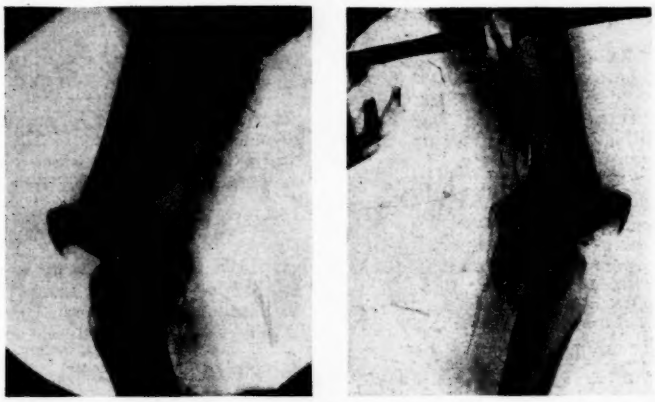

Fig. 1 (Servelle). Left, Aneurysm of the right popliteal artery. Right, Same patient. Aneurysm of the left popliteal artery.

stump below the knee or at metatarsal levels, but they would never have tolerated such an amputation without sympathectomy. The author describes the type of amputation used in such cases. He then discusses the technique of lumbar sympathectomy on the lower extremity. The results were as follows:

1. The extremity warms up faster and cools more slowly on direct exposure. Reflex effects of heat and cold are ineffective.

2. The high vasoconstrictor tonus in the sitting or standing position is abolished.

3. Vascular exercises such as intermittent venous hyperemia are more effective.

4. Any cross stimulation between sympathetic and demyelinated sensory fibers is abolished.

5. During effort the sympathectomized extremity will not cool off; on the contrary, it may become warmer.

The authors summarize their article as follows:

A group of 57 patients with vascular sclerosis of the lower extremities has been studied. If after preliminary block of the lumbar sympathetics the temperature of the digits rose, walking ability improved, and generalized vascular involvement was not extensive, a lumbar sympathectomy was performed. In one group of patients this operation resulted in a dramatic increase in walking ability; in a second group amputation was averted; in a third group intractable neuritic pain of the causalgic type was benefited, and in a fourth group amputation could be performed at a lower level. In rigidly selected cases of peripheral arteriosclerosis, lumbar sympathectomy has been of great value. PAUL MERRELL, M.D.

Servelle, M.: Arteriography and Heparin in the Surgery of Arterial Aneurysms (Artériographie et héparine dans la chirurgie des anévrismes artériels.) *Rev. chir.*, Par., 1946, 65: 373.

A frequent error in the differential diagnosis of arterial aneurysm is that dilatation of the vessel in its whole length (mega-artery) is mistaken for an aneurysm. In this condition, arteriography is an invaluable diagnostic help. Since the two disturbances require a very different kind of treatment, arteriography in all doubtful cases prior to surgery seems to be indicated. Furthermore, in cases of true aneurysm, arteriography gives an exact picture of the size and position of the sac and its relation to the artery, and enables the surgeon to decide before the operation which type of intervention is indicated.

The second part of the article is devoted to the use of heparin as an anticoagulant in the surgery of aneurysm. The author prefers heparin to dicoumarol because its effect takes place more rapidly and the heparin is eliminated in a much shorter time than dicoumarol. Consequently, there is no danger of secondary hemorrhage.

Heparin is applied topically as well as by intravenous injection. Preoperatively, the suture material for the arteries is soaked in a 10 per cent heparin solution, and during the operation the arterial wall and the aneurysmal sac are irrigated with a 2 per cent solution in saline solution. After the operation, 2 c.c. of heparin are injected intravenously for 3 days. As suture material for the arteries, the author uses linen (No. 0 or 1) and warns against the small threads of silk or catgut (000 or 0000) which are not resistant enough. WERNER M. SOLMITZ, M.D.

BLOOD; TRANSFUSION

Sabaneev, D. P.: Plasmol S-25. *Vrachebnoe Delo*, 1946, No. 9, 618.

The Kiev Institute for Blood Transfusions and Emergency Surgery has produced a preparation from the blood plasma and serum of the human being which has been designated plasmol S-25. This material is for use in the method of tissue therapy developed by Filatov. The material has been dried in vacuum

at various temperatures (not above 20°C) and under various conditions of temperature and humidity, so as to vary to any desired degree the development of the "conservation factor." The resultant product can then be dissolved in any desired amount of fluid and injected subcutaneously or intracutaneously under exact conditions of dosage. The present product was the twenty-fifth in the series and was thus designated plasmol S-25.

When the plasmol is injected into the ear vein of the rabbit it produces an initial vascular spasm (up to 20 seconds) followed by an intense hyperemia lasting from 15 to 20 hours. When perfused through an isolated organ (the kidney) in 1 to 1,000 dilution, the rate of drop coming from the corresponding veins is reduced to one-half. When injected subcutaneously some sensation of burning is produced; however, in more than 3,000 injections in the human being there was not a single unpleasant incident (abscess, phlegmon).

The preparation when injected into and under the cicatrices and keloids resulting from burns, or even when injected at a distance from the lesion, in 27 patients in a dosage of 1 gm. every 5 days, resulted in marked improvement in 14 patients and improvement in 9. In the remaining 4 patients bits of tissue were transplanted instead of the plasmol. Two hours after intracicatricial injection the scar would undergo an intense hyperemia lasting for 2 or 3 days and the following day there would be some edema. At the end of 6 weeks the scar would be soft and flattened, and among the cases in which the cicatrix was subsequently excised, there was not a single instance of recurrence. In 3 patients with warts, the warts had disappeared after 3 weeks of treatment, and injections of the plasmol made directly under the warts hastened their disappearance, which occurred after 10 or 12 days. When treatment was started, several of the patients were suffering from a mild case of boils; these lesions would immediately dissolve in a serosanguineous liquid and dry up in a period of 2 or 3 days.

Following the subcutaneous injection of 1 gm. of the plasmol in the groin of patients with acute orchitis, the temperature would fall by lysis in from 6 to 8 hours, the pain would disappear within from 30 to 40 minutes, and the infiltration would leave without trace after from 7 to 10 days. The same results were obtained in men with acute epididymitis, after 2 or 3 weeks, and in women with salpingitis, oophoritis, and paraperimetritis, the results were just as dramatic.

Of a group of 139 patients with ulcer, who were receiving stationary or ambulatory treatment, some had undergone gastroenterostomy, and some had duodenal ulcer and stomach ulcer. Treatment in these cases consisted of 4 injections of 1 gm. of the plasmol at intervals of from 5 to 7 days. The injections were administered under the skin of the abdomen along the outer third of a line drawn from the navel to the twelfth rib on the right side. In the patients so treated improvement would be noted by the end of the third week; the pain had disappeared, and also the acid belching and vomiting. Analysis of the gastric content demonstrated marked lowering of the total acids. In a few patients the niche was observed to disappear after 6 weeks of treatment. Results were so good that now the patient is put on a general diet on the second day following the second injection. The patients soon regain their weight, become active, and their appetite improves. The roentgenological findings of the stomach content and stool show marked improvement and active regeneration appears in the blood picture.

A special group of cases was made up of patients with nerve diseases: hemiplegia on a traumatic basis (3 cases), lumboischialgia (9 cases), spondyloarthrosis (4 cases), and neuralgia of the trigeminal nerve (2 cases). In the lumboischialgias the stiffness in the loins and pains disappeared in 20 or 30 minutes after the first injection and no repetition of the injection was necessary. Voluntary ovements of the extremities in the cases of hemiplegia and the power of speech in 1 patient with an accompanying aphasia, were recovered after 6 weeks of treatment. The trigeminal neuralgias disappeared after the fourth injection.

A large group of cases presented nonhealing wounds and trophic ulcers. In these the plasmol was injected in 1 gm. doses immediately under the sore at 5 day intervals. On the second day after the first injection the ulcer began to clear up, the granulations assumed a healthier appearance, and in some instances an intense phagocytosis appeared, which increased with the following injections. The same results were attained with injections at a distance. The wounds or ulcers were completely healed in 2 or 3 weeks, no matter how long the ulcer had been present before treatment.

Future articles will give greater detail regarding the chemical and mechanical mechanisms, as well as the experimental work on this preparation, which is being carried on at the present time.

JOHN W. BRENNAN, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Wangensteen, O. H.: Care of the Patient before and after Operation. *N. England J. M.*, 1947, 236: 121.

Poor risk patients undergoing extensive surgery demand careful consideration as to water requirements, electrolyte needs, blood loss, and caloric and nitrogen requirements. The urine output and the specific gravity of the urine serve as fairly satisfactory guides in determining how much fluid to give. A 24 hour output of 1,000 to 1,500 c.c. of urine with a specific gravity in the range of 1.015 to 1.020 is optimal. A fluid intake of 2,500 to 3,000 c.c. ordinarily will fill these requirements. Glucose solutions in water are given on the day of operation. If an inlying duodenal tube is in place to which suction is being applied, allowance must be made for such electrolyte loss. A good working rule is to estimate the loss of sodium chloride at 5 gm. per liter of gastric aspirations. In the author's experience the weighing scale is superior to other procedures in determining early variations in the state of hydration. Patients are weighed daily before surgery to establish the normal weight.

Postoperatively, beginning usually on the day after operation, the patient is weighed either on a portable scale brought to the bedside or by means of a bedside scale which permits weighing the patient in bed. The method can be readily carried out to an accuracy of 100 gm. In a patient weighing 70 kgm. this figure represents 0.14 per cent of the body weight. Over the short postoperative period when the weighing scale is utilized, it is reasonable to assume that most of the weight fluctuation represents differences in body hydration. The basic caloric requirements of the patient after operation are usually met by the daily intravenous administration of 3,000 to 3,500 c.c. of 10 per cent glucose solution. If an inadequate amount of sodium chloride is given at the same time, a liberal urine output may follow and dehydration will ensue in a few days if the electrolyte loss is not restored. Saline solution is ordinarily satisfactory to restore the electrolyte balance. It is the practice of the author to await evidence of diuresis before utilizing intravenous saline solutions.

Patients whose food intake has been poor and who have lost considerable weight are poor subjects for operation. These patients are considerably improved by feeding a mixture rich in proteins and carbohydrate and low in fat, provided there is no pyloric obstruction. For those patients with pyloric obstruction, the preoperative preparation is accomplished by the intravenous feedings of amino acids, plasma, and glucose. The diet should be fortified with adequate amounts of vitamin C and vitamin K.

FRANK F. KANTHAK, M.D.

Marino, H.: Surgical Treatment of Gigantic Nevi (Tratamiento quirúrgico de los nevus gigantes). *Prensa méd. argent.*, 1946, 33: 1321.

Nevi, of many varieties (verrucous, pilous, molluscum, hypertrophic, pigmentary, avascular, vascular), are common dermatologic diseases. In addition to a nonesthetic aspect, they always present the possibility of malignant change, which indicates radical treatment, even if a small depressed scar is left. The author does not favor prophylactic extirpation of all nevi but sticks to the rule proposed by Adair: "Leave the brown moles alone, be concerned only with those which contain definitely black pigment." Once extirpation is decided upon, it must be radical in order that no after effects will occur. It can be performed by galvanocautery, diathermocoagulation or surgical excision. As for pigmentary moles with melanotic cells, the only possible treatment is surgical excision with minimum disturbance of the dangerous cells, most delicate handling of the tissues, and incision at a good distance from the tumoral border.

The problem becomes more serious if the nevus is very large. Gigantic nevi, always of congenital origin, may cover any part of the body. They are often tuberous, hypertrichosic, pigmentary, or papillomatous. The only possible treatment is surgical excision, and the raw surface is covered with a graft, either free or pedicled. In cases of this type, if the operation is to be in one stage, it is advisable to prepare the

Fig. 1. (Marino) Black nevus of hand and forearm treated with coagulation, solid carbon dioxide, and irradiation. Bad scarring with radiodermatitis, loss of extensor tendons and ankylosis of the joints with deviation of the hand. Large pedicled graft from abdomen. The patient is satisfied and does not want the complete plastic repair.

patient carefully, to avoid the danger of shock due to the large bleeding area left by the extirpated tumor and the donor graft. Blood and plasma transfusions will be of value during and after the operation. Naturally, if the patient's condition requires it, the procedure can be divided in more stages. However, the author prefers the extirpation "in toto" (one block of the diseased tissues), followed by immediate grafting, whenever possible, even if there was some infection of the lesion.

As for the skin required to cover the raw surface, preference is given to the free graft, the pedicled graft being employed only to cover joints and tendons, or in case of lack of subcutaneous tissue. A free graft will almost always give good results as the tissues under a nevus can be considered as normal. On the face the full thickness graft can be used, but a good thick split graft is equally satisfactory and does not present the problem of coverage for the donor area.

Technically, all cases must be carefully studied, as there will be difficult problems of selection of the donor surfaces, immobilization, and dressing, which are the key to success. Padgett's dermatome is a great help in obtaining the necessary skin and long strips may be cut which in some cases are wrapped around a limb as a cutaneous bandage and fastened with only a few running stitches. Electrocoagulation is used to control bleeding. As for the dressing, it is fixed by an immobilizing plaster cast.

HECTOR MARINO, M.D.

Macomber, W. B., and Rubin, L. R.: Tubed Pedicle Complications in Repair of Massive Tissue Defects. *Plast. Reconstr. Surg.*, 1947, 2: 10.

In a study of more than 300 tubes which was made at an Army General hospital, the authors have listed the complication which developed in the making and transferring of tubes. In these cases, despite various minor erosions, all but 2 transfers were completed.

The tubed pedicle, with its network of blood vessels in the subcutaneous layer, provides an excellent medium for filling large defects. The principles of massive tissue movement are the same in all flap transfers. Several factors must be remembered. The main blood supply to the skin and subcutaneous tissue comes from vessels deep in the fat. These usually course just above the deep fascia, with branches going upward to form an anastomosis beneath the dermis. Another layer of networks can be found just under the malpighian layer. It becomes apparent from this principle that in all massive tissue movements the fat and the deep fascia must be included in the flap if the blood vessels are to be included for nutrition. Tension serves to stretch the elastic fibrils in the skin and constrict the vessels, which causes death of the tissue. The graft is dependent upon a delicate blood supply, therefore gentle handling of the tissue is essential. Rough manipulation causes thrombosis of the blood vessels. The skin itself is never held with a forceps. Blunt dissection with scissors or the fingers is never used to separate layers. Hooks are excellent to hold tissue. Raw surface must not be left uncovered unnecessarily without moisture. Tissue holding by the hands should be limited to absolute necessity.

Fig. 1. (Macomber) Illustration of folding of skin flap to see if it will tube easily. This must be done the entire length of the tube, since folding at the corners diminishes the length of the free tube. The easy folding must be present along the entire desired free length.

Perhaps all the necrosis along the line of suture can be traced to tension. Too much fat is included in the tube or, conversely, the tube is insufficient in width. The safest way to avoid this complication is to mark out the prospective tube flap on the skin with methylene blue. Only one incision is made at first. The flap is undermined completely from this one incision, dissection being done with a sharp knife along the fascial plane. All bleeding is carefully stopped. When the undermining reaches the line previously marked on the skin, an attempt is made to fold the skin under as if to tube it. The authors indicate that suturing a tube with No. B silk for the skin only is adequate.

The need for subcutaneous sutures or heavier skin silks is indicative of too much tension. Should the tube be too tight despite all of the precautions taken, it is advisable to employ a split skin graft on the under surface of the flap, as well as on the donor site, instead of trying to make the tube. Whenever a very long tube is used, the length must be balanced by adequate width to insure an adequate blood supply at the center of the tube.

The authors warn against completion of delayed transfer in one stage because necrosis of the tip may result. Infection and hemorrhage are the main complications of secondary delays. In this delay all long vessels coming into the distal end of the flap are ligated.

The procedure of transfer of the tube and flap requires great care. The flap is lifted from the donor site and both the tube and flap are carefully observed. Any blanching is a signal for return. The complications are many. Arterial changes may be noted at once by blanching.

Poor venous return can be noted early by bluish discoloration. To facilitate venous return, it is best to have the recipient site at a higher level than the donor site. The flap must fill the defect. It cannot, however, be stretched in any way. Normal skin ten-

sion is necessary to prevent kinking of the vessels. Any twist, kink, or angulation of the tube will interfere with the circulation and cause necrosis.

C. FRED GOERINGER, M.D.

Escobar Pacheco, A.: Venous Ligation in Pulmonary Infarction (Ligaduras venosas en los infartos pulmonares). *Arch. Soc. cir. hosp.*, Santiago, 1946, 16: 555.

In a study of 15 cases of pulmonary embolism of which 7 revealed mitral involvement, 3 aortic insufficiency, 2 phlebothrombosis, 2 Hodgkin's disease, and 1 hypertension, the author found the following symptoms: hemoptysis in 12, cyanosis in 7, costal pain in 6, subicterus in 5, edema of the legs in 3, Homans' sign in 3, doubtful Homans' sign in 2, shock in 1, and pain in the calf in 1.

Venous ligation was practiced in all of the cases; 1 case was subjected to ligation and section of the femoral vein, 5 to ligation and section of both femoral veins, 6 to ligation of both iliacs, and 3 to ligation of the inferior vena cava. All of the operations were done in three stages. First a simple ligation of the internal saphenous was done; then simultaneous ligation of the collaterals after aspiration by means of a cannula, both the afferent and efferent vessels expelling clots. In the second stage, a 5 cm. vertical incision medial to the palpable femoral artery was made and on reaching the femoral vein, the afferent portion was ligated twice while the efferent portion was ligated once. An incision was made between the ligatures. The third stage was done only after it was certain that the other ligations produced no impairment of the circulation of the limb as evidenced by edema and cyanosis. In this stage the external iliacs were ligated by means of a 5 cm. incision above Poupart's ligament, the location of the femoral artery being at the midpoint of the incision. The skin was opened and the aponeurosis of the external oblique muscle was incised. With the separation of the internal oblique and transversus abdominis muscles, the transversalis fascia is next opened, which brings into view the iliac artery and vein. A Deschamps needle is used to pass a ligature from the lateral to the medial side to avoid the risk of puncturing the artery. The vein is ligated without section. In the last stage the vena cava is ligated through a 5 cm. pararectal incision on the right side, which passes through the external oblique, internal oblique, and transverse abdominis muscles, peritoneum, and retroperitoneal tissues. The vena cava is ligated above the union of the common illiac and below the renal veins. Local anesthesia was used in all except 1 case.

The circulation was re-established by means of the pudendal, circumflex, epigastric, and gluteal veins, which unite with the internal iliac, and the posterior parietal, iliolumbar, and lateral sacral veins which empty into the inferior vena cava by means of the azygos.

This procedure brings about a marked and immediate improvement in the subjective and objective condition of the patient in relation to the cardiac insufficiency. It was shown that there is absolutely no harm done to the return flow of the legs by ligating both femoral veins or both iliacs, and even the vena cava, at the point indicated. Not only is it necessary to intervene early before the thrombus reaches a place not accessible for venous ligation but also to ligate as high as possible.

ARTHUR F. CIPOLLA, M.D.

Stewart, J. D.: Wound Shock. *J. Am. M. Ass.*, 1947, 133: 216.

Although it is recognized that there are many causes of shock in battle casualties, there is considerable evidence to indicate that loss of blood dominates the early picture in the majority of severe wounds inflicted by penetrating high explosive missiles.

A group of gravely wounded, nontransportable casualties were examined in forward field hospitals a few miles behind the battle line. All were in actual or imminent shock on admission. Compound fractures, traumatic amputations, and penetrating abdominal and thoracic wounds predominated in the 100 cases studied. In the majority of cases, the wounds were multiple. Seventeen of the 100 patients died under observation. The average interval between wounding and admission was 4.9 hours (maximum 25.2 hours). Plasma volume, plasma protein concentration, and the red cell hematocrit reading were determined immediately after admission, and again 24 hours later after restorative therapy and operation. Further determinations were made subsequently. Reduction in blood volume of the patients was found to be the rule just after admission. Despite the fact that the average patient had received a pint of plasma and a small amount of blood, his blood volume had risen to 95 per cent. In some cases oligemia was still present at the end of 24 hours, despite replacement therapy, and presumably further loss of blood had taken place. Undercorrection was most common. It was found that at the end of 25 hours the average was still 5 per cent below normal, and there was an associated reduction in the hematocrit reading and in the plasma protein concentration. He believes, on the basis of this study, that the average soldier receiving a serious shock-producing wound must be given at least 2,000 c.c. of blood if the volume of blood is to be restored to approximately normal in 24 hours. Studies made later show that the quantity of blood required to repair the immediate oligemia of shock is insufficient to maintain normal hemoglobin and plasma protein values during the early period of repair of the wound, and convalesence.

It appears that in traumatic shock some correlation exists between the lowering of systolic blood pressure and the degree of oligemia; that is, the initial blood volume is lower in those cases with lower systolic blood pressure readings. Thus, in 5 patients who were admitted with a systolic pressure of zero the average initial blood volume was 58.7 per cent; in 20 patients with an initial systolic blood pressure of less than 100, the initial average blood volume was

77.5 per cent; and in a group of 21 patients whose systolic blood pressure at the time of admission was 100 or over, the initial average blood volume was 81.6 per cent. If the entire group of severely wounded casualties is divided according to the initial reading of the blood pressure, it is found that the amounts of plasma and blood administered in the first 24 hours showed some correlation with the blood pressure readings. The lower the blood pressure, the greater the amount of blood and plasma considered clinically necessary and given in restorative therapy.

It is believed that the average loss of blood was 2,500 to 3,000 c.c., or about half the normal volume of blood. The depletion of blood volume in traumatic shock could conceivably be due to loss of water and electrolytes, loss of plasma, or loss of whole blood. Accordingly, the concentrations of plasma protein, red cells, and nonprotein nitrogen in the plasma were of interest. It was found that the average concentration of protein in the plasma on admission was 6.5 gm. per 100 c.c., and that the average red cell hematocrit reading was 37.5 per cent. The average nonprotein nitrogen value in the plasma was 30.8 mgm. per 100 c.c. These values offer confirmatory evidence of the absence of anhydremia. Hemodilution, which is a characteristic physiological response to severe hemorrhage, was a uniform finding in this group of patients.

If one considers the typical hematic changes in wound shock, namely, oligemia and reduction in concentration of hemoglobin and plasma protein, there seems to be little room for debate over the relative merits of plasma and blood in repair. Evidence indicates that massive quantities of blood are lost. Relief of tissue anoxia, under the circumstances, is an urgent requirement to be met by replacement of circulating hemoglobin values and improvement in the amount of oxygen carried by the blood.

During convalesence it was evident that blood volume, plasma protein concentration, and the hematocrit reading remained low for days or weeks. Plasma volume soon became normal. The persistent deficit of hemoglobin and plasma protein is accompanied by overdilution, and some sacrifice of concentration is made in restoring the volume of blood to normal.

The operation is at times essential to resuscitation, and it is an important matter of judgment to know when to operate. The average interval between admission and operation was 4 hours.

Of the 100 gravely wounded patients, 17 died under observation. Only 5 died in relation to a possible state of "irreversible shock." However, persistent hemorrhage and insufficient replacement of blood could not be excluded as likely causes of death in these 5 patients; therefore this concept is open to question.

The present article is largely concerned with wound shock which is due to severe trauma, not including burns, and for the most part is still uncomplicated by such lesions as clostridial myositis, spreading peritonitis, or pulmonary thromboembolism.

LEROY J. KLEINSASSER, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Young, H. H., and Ghormley, R. K.: Accidents on the Farm. *J. Am. M. Ass.*, 1946, 132: 768.

In the 9 years from 1935 through 1943, 575 accidents on the farm caused the person injured to come to the Mayo Clinic. The majority of these patients came from the surrounding four or five counties, but the total number is not an index of the total farm accidents that occurred in those four or five counties. The clinic total may be said to represent with fair accuracy the number of serious accidents that occurred in these counties during that period. Included in the study were all accident cases encountered at the clinic which were due to falls, farm machinery, livestock, injuries in the farm home, buzz saws, etc. Omitted were all automobile and highway accident cases.

Falls led all other causes of accidents in this series and carried a mortality rate of 5 per cent per 100 accidents. The commonest accident of this type was that in which the patient fell off some piece of farm equipment. Accidents attributed to farm machinery followed falls in a close second place as the cause of farm accidents in this series; there were 186 such accidents. Although there were no hospital deaths in this group, the morbidity rate was extremely high. Exactly a third of the patients in this group suffered from traumatic amputation of a part or the whole of one or more extremities. The tractor caused the largest single group of accidents and was followed closely by the corn picker, corn shredder, and buzz saw. The third most frequent cause of the accidents in this series was livestock; there were 104 such accidents. The mortality rate in this group was 5 per cent; 3 deaths were due directly or indirectly to horses, and 2 deaths were caused by bulls. Seventy-seven of the accidents were caused by the axe, by falling trees, or by a group of unclassifiable causes. In the entire group of 575 accidents in this series, the injuries sustained consisted of 396 fractures, 65 traumatic amputations, 25 instances of transverse myelitis, 9 of perforating perineal wounds, 7 avulsions of the skin of the penis and scrotum, and 208 miscellaneous injuries. In this series of cases there were 18 deaths, a mortality rate of 3 per cent per 100 cases.

An educational program for the farmer is the first step in decreasing the number of accidents on the farm.

Brown, A.: Morphological Changes in the Red Cells in Relation to Severe Burns. *J. Path. Bact.*, Lond., 1946, 58: 367.

In a previous study of the hematological changes in burns it was shown that burns involving more than 15 per cent of the body surface are frequently followed by a rapidly occurring moderately severe anemia which is associated with a slight increase in the mean corpuscular volume, increased erythrocyte fragility, and increased plasma bilirubin and

urobilin excretion. The present studies are concerned with the variations in mean corpuscular volume, mean corpuscular diameter, and mean corpuscular average thickness in relation to variations in osmotic fragility and the mechanism of production of the anemia in severe burns. Hemoglobin was estimated photoelectrically. Saline fragility was determined quantitatively by comparison with a standard equivalent to 50 per cent lysis as determined by a Duboscq colorimeter. Red cell diameters were measured by microprojection on millimeter-ruled graph paper magnified to 1,000 diameters. Evenly spread coverslip preparations stained by Leishman's stain were used and 400 cells in each film were measured.

Investigation of the morphologic changes occurring in the red cells of 3 very severely burned patients showed that fragmentation of the red cells and microspherocytosis occur within a few hours of the injury and are associated with an increase in the mean corpuscular average thickness. The morphologic changes occurring in the red cells in burns can be attributed to the direct action of heat on the cells. The maximum effect is immediate fragmentation and destruction. If the damage is less severe, microspherocytosis is produced and the affected cells are unduly susceptible to the physiological trauma of the circulation. Hemoglobinemia and hemoglobinuria may occur according to the magnitude and rate of hemolysis. FRANK F. KANTHAK, M.D.

Gubern Salisachs, L.: The Vegetative Nervous System and the Anesthetic Infiltration of the Sympathetics in Traumatology (El sistema nervioso vegetativo y las infiltraciones anestésicas del simpático en traumatologia). *Cirug. apar. locomotor*, 1946, 3: 97.

All trauma necessarily produces a necrosis which brings into consideration adaptation mechanisms, the aim of which is to re-establish the physiochemical equilibrium of the tissues which are altered by the lesion. Humoral and nervous factors are in close correlation. The humoral factors are seen as a zone of static hyperemia surrounding the focus, while this in turn is surrounded by a more extensive zone of active hyperemia, produced by the liberation of histamine like substances. Among the nervous factors is an axonic reflex, which in the periphery gives rise to muscular contracture and muscular atrophy and results in pain in the central portion. The healing of the necrosis is favored by rest and the active vasodilatation produced by local anesthesia and anesthesia of the sympathetics.

Treatment of 300 or more cases by anesthetic infiltration of the sympathetics resulted in a decrease of the pain and healing time. The following routine was carried out: the use of 3 infiltrations of novocain per week until the condition was cured, or, if a solution of novocain in oil was used, only 2 infiltrations per week were necessary. After 15 or 20 days, treatment with infiltration was suspended in the bone lesions, and after 8 days, in the traumatized tendons or aponeuroses. In trauma which manifests a doubtful mechanical disorder, the first 2 infiltrations gives one an idea as to whether or not to apply orthopedic treatment, while sometimes the infiltrations only decrease the edema of the traumatized area, which makes complete mobilization possible. It also gives excellent results in post-traumatic ulcers, although sometimes ganglionectomy must be done. The drawbacks to this procedure are as follows: (1) the technical difficulty, especially in lumbar infiltration; (2) the pain produced by the injection; and (3) the limited time of action.

The best results were obtained when Feng's mixture was used, which consists of novocain, acetylcholine, and vitamin B. ARTHUR F. CIPOLLA, M.D.

Rustigian, R., and Cipriani, A.: The Bacteriology of Open Wounds. *J. Am. M. Ass.*, 1947, 133: 224.

As part of a study of penicillin therapy in the management of wounds in Italy, a total of 214 types of bacteria were isolated from 27 infected and 9 clinically clean wounds; 45.3 per cent (97) of the 214 isolates, representing several genera, were obligatory anaerobes, and 15.9 per cent, or 34 cultures (streptococci and micrococci), were microaerophiles. This emphasizes the decidedly anaerobic environment of the bacteria in these traumatic injuries. The clean wounds differed from the infected wounds in the absence of pyogenic cocci. Beta hemolytic streptococci, Staphylococcus aureus, Staphylococcus albus, enteric streptococci, clostridium, Proteus, Pseudomonas, and coliform bacteria appear to be the species most frequently encountered. Other species less frequently reported include undifferentiated streptococci, anaerobic streptococci, micrococci, bacteroids, diphtheroids, and bacilli.

The 214 bacteria isolated were differentiated under 3 functional entities: (1) toxigenic and/or invasive, (2) proteolytic, and (3) wound commensals. Of the toxigenic and/or invasive bacteria, there were 33 in the following order: Staphylococcus aureus, hemolytic streptococci, Clostridium perfringens, Clostridium novyi, Clostridium septicum, and unidentified clostridia.

It was noteworthy that bacteria-producing proteolytic enzymes occurred with a relatively high frequency in 193 of the 214 isolates tested. There were 63 in the hydrolyzing proteins group and 16 in the group producing hydrogen sulfide and/or visible gas from peptones.

There were 102 in the group of commensal bacteria. It is, of course, known that a synergistic relationship resulting in considerable wound involvement, may occur.

The combination of various bacteria in each of 36 wounds had been reported previously. In the final analysis, the interplay of metabolic activities of the true pathogens, the proteolytic bacteria, and those regarded as wound commensals, may be of major importance in the development of infection. The combined proteolytic reactions of several bacteria might be much more effective in causing septic decomposition of dead tissue than their individual reactions.

It is concluded that lines of demarcation of infection of wounds appear to be more practical clinically than bacteriologically. It is pointed out that although penicillin is very effective in the treatment of certain combinations of wound infection, surgical treatment is essential in the ultimate care of these infections. LEROY J. KLEINSASSER, M.D.

Glenn, F.: Tetanus—A Preventable Disease. *Ann. Surg.*, 1946, 124: 1030.

In the battle for Manila, the civilian population was not only subjected to injury from the besieging Americans, but also, it suffered the restrictions of medicines, water, and food imposed by the Japanese. As a result, the incidence of tetanus among wounded civilians was high. In the San Lazaro hospital alone, 156 cases of tetanus developed in a group of 1,100 wounded noncombatants. However, not one case of tetanus developed in American military personnel engaged in combat in the same theater of operations. Compound comminuted fractures of the long bones, together with extensive soft tissue infection and damage, were most frequently associated with tetanus which appeared in from 3 to 20 days after wounding. Both varieties of tetanus, the local and general, were commonly found in the same patient. Common findings were trismus and orthotonus, followed rapidly by opisthotonus and the characteristic risus sardonicus. Finally, the tetanus progressed so as to include the muscles of the abdomen, the neck, and the thoracic respiratory muscles. Trismus was present in all cases, whereas dysphagia occurred in about 75 per cent of all cases. Cephalic tetanus was not observed, but the deep reflexes were increased early in the disease. Ptosis of the eyelids or facial paralysis was observed in a small percentage of cases. Spasm of both the vesical and rectal sphincters was present in varying degree.

Surgical treatment in patients with tetanus, although of value for the sepsis and general condition of the patient, did not alter the course of the tetanus. Penicillin administered intramuscularly had no effect upon tetanus, neither did it show any effect when used topically in cases of local tetanus. The mortality rate from tetanus was 90 per cent with most of the patients dying within 10 days of the onset of symptoms. Morphine sulfate given in .008 gram doses proved of great value for the relief of the spasm. Paraldehyde and chloral hydrate were beneficial to a limited degree. The barbiturates were of little or no value. Ether in oil was effective in reducing convulsive seizures. Philippine physicians favored the use of a 25 per cent solution of magnesium sulfate given intramuscularly in 2 c.c. doses, but this caused severe respiratory depression. In the prewar years there were about 100 cases of tetanus yearly with a mortality rate of 25 to 35 per cent. There was little tetanus antitoxin available for civilian use.

There were no cases of tetanus among wounded soldiers in the Southwestern Pacific Area, while in the entire U.S. Army only 11 cases were reported during the war years and, of these, only 1 case developed in a combatant. This remarkable result was accounted for only on the basis of immunization by tetanus toxoid and subsequent reinforcement by yearly booster doses.

Dr. Churchill, in discussing this paper, reported that tetanus was found among the wounded German prisoners of war, many of whom died. The Germans only immunized the Luftwaffe and special personnel. The Italian soldier was immunized against tetanus.

BENJAMIN G. P. SHAFIROFF, M.D.

Lyons, C.: Chemotherapy in the Management of Wounds. *J. Am. M. Ass.*, 1947, 133: 215.

The limited role of chemotherapy in the management of wounds is emphasized. The prevention of infected wounds is accomplished by active immunization with tetanus toxoid and initial surgical management. The major usefulness of chemotherapy is for the treatment of initial, reparative, and reconstructive phases of the surgical management of a wound. This is most expeditiously accomplished by the systemic administration of the selected drug. Invasive infection demands the presence of hemolytic streptococci, staphylococci, or toxigenic clostridia. The clinical pattern or invasive infection indicates the presence of true pathogens, but suppuration of a wound may be due to true pathogens, wound pathogens, or a combination. The combined experience of the last two World Wars has shown that the cleanly excised wound of soft parts develops invasive infection due solely to hemolytic streptococci. Suppuration of a wound is believed to be due more to the presence of a pabulum of wound protein than to any specific bacterial virulence. No available antibacterial agent can completely sterilize an open wound. Topical, or local, chemotherapy has been discarded as ineffective and deleterious. Suppuration of a wound is an indication for repeated surgical treatment of the wound.

Closure, not sterilization, of the wound is the practical objective of the early phases of management. Efforts to abolish infection are necessarily integrated with efforts to expedite the healing of the wound. The most important accessory procedures in this regard are the correction of anemia and the restoration of tissue protein deficits. The known depressant effects of sulfonamide compounds on hematopoiesis, the intestinal synthesis of essential metabolites, and the appetite in general are further reasons to establish penicillin as the chemotherapeutic agent of choice in the management of wounds.

The author reviews the experiences which show that the persistence of devitalized tissue or sequestra prevents chemotherapeutic sterilization of the wound. Many of the organisms are naturally resistant, and the most important of these is the Clostridium sporogenes which is resistant to sulfonamide compounds, penicillin, and streptomycin. The important aerobic gram-negative wound pathogens are resistant to sulfonamide compounds in exudates from the wound, are insensitive to penicillin, and inherit or readily acquire a resistance to streptomycin. Clinical experience with established infection has shown that the sulfonamide compounds are extremely effective

against hemolytic streptococci, have a limited usefulness against staphylococci, and are relatively ineffective against gas gangrene. Streptomycin is ineffective against the clostridia. With the exception of individually resistant strains, penicillin is effective against all the potentially invasive pathogens. Sulfonamide therapy has been shown to be adequate for the wound endangered only by hemolytic streptococci. Penicillin is the drug of choice for all other wounds subject to invasive infection. No virtue is attached to combinations of these two agents in the treatment of infected wounds.

LEROY J. KLEINSASSER, M.D.

Hirsh, H. L., Dowling, H. F., Vivino, J. J., and Rotman-Kavka, G.: Penicillin in Beeswax and Peanut Oil, a New Preparation Which is Fluid at Room Temperature; Absorption and Therapeutic Use. *J. Lab. Clin. M.*, 1947, 32: 34.

The authors report the results of their experience with the use of a modified preparation of penicillin in beeswax and peanut oil, which is liquid at room temperature. Following the intramuscular injection of 300,000 units, 18 out of 20 subjects had detectable concentrations of the antibiotic 12 hours after injection, while only 5 of the 20 had significant concentrations after 20 hours. Six hundred thousand units were injected intramuscularly into 36 subjects; 20 of the 36 had assayable concentrations after 20 hours, while all except 2 had significant concentrations after 12 hours. The subcutaneous administration of 600,000 units of the preparation was carried out on 20 patients; all but one patient had detectable amounts of penicillin in the blood stream at 24 hours.

This preparation was used clinically with satisfactory results. Seven cases of previous penicillin-resistant gonorrhea responded to a single injection of 600,000 units of penicillin in wax and peanut oil. A case of subacute bacterial endocarditis due to Streptococcus viridans was treated with 300,000 units every 12 hours and was later placed on 600,000 units injected once a day. The patient made an uneventful recovery.

F. J. LESEMANN, M.D.

Morginson, W. J.: Toxic Reactions with Penicillin. *J. Am. M. Ass.*, 1946, 132: 915.

The toxic reactions to penicillin are classified and discussed according to the mode of action of the antibiotic.

Penicillin may act as a direct toxin and primary irritant. Certainly this direct toxic effect is minimal in therapeutic concentrations. Purification apparently tends to reduce the toxicity. For practical purposes penicillin has a direct toxic action only when used intrathecally, and this toxic effect is due to the penicillin itself rather than to the impurities. However, this does not condemn the intrathecal use of penicillin in proper dosage. Probably the dose should never be in excess of 30,000 units when given by this route.

Penicillin may act as an antigen. The immediate allergic reactions to penicillin usually occur in a person with a previous exposure to penicillin, but a small percentage of people are primarily sensitive to the drug. This may be because the individual possesses a general sensitivity to moulds. It has been suggested that an exacerbation of a previous fungus infection or vesicular eruption involving the feet, hands, and groins following penicillin therapy may be due to this sensitivity. Penicillin sensitivity may be of short duration or it may last for long periods, and the sensitivity may be epidermal or dermal, although the principal shock tissue appears to be the vascular system. The allergic symptoms produced by penicillin sensitivity are usually mild, but may be serious, appearing as a severe angioneurotic edema with edema of the pharynx, larynx, and lungs, which may lead to a fatal termination. When a patient is sensitive to crystallin penicillin, as shown by a cutaneous reaction, or suspected when different lots from various manufacturers give symptoms, continued therapy should be used with extreme caution.

Penicillin may cause therapeutic shock or Jaresch-Herxheimer reaction if used in cases of syphilis. Focal reactions of intensified chancre or the appearance of cutaneous lesions may result; or systemic reactions of malaise, generalized aching, painful adenopathy, and temperature elevation may occur. Such a reaction occurring during the routine treatment of gonorrhea in which syphilis is not suspected is at least very suggestive of concurrent syphilitic infection. Fever following the use of purified penicillin is rare and should always arouse a suspicion of the Herxheimer reaction.

Penicillin may have an indirect action on the pathological process. Particularly in late syphilis, too rapid healing of cardiac and liver lesions may result in deforming sclerosis.

In the discussion of the article, it is pointed out that the rate of sensitivity to penicillin is significantly increasing and it is therefore most important that this antibiotic not be administered for trivial or unnecessary conditions. F. J. LESEMANN, M.D.

Frisk, A. R., Hagerman, G., Helander, S., and Sjögren, B.: Sulpha-Combination — A New Chemotherapeutic Principle. *Brit. M. J.*, 1947, 1: 7.

The formation of renal concretions is one of the most serious drawbacks to sulfonamide therapy. The authors advocate using a mixture of sulfonamides to obviate this danger. The use of such a mixture is predicated by the following statements: the antibacterial effect of a mixture of several different sulfonamides is the sum of the effects of the various compounds; (2) the sulfonamides of a mixture as well as their acetyl derivatives do not affect the solubility of each other and thus the use of a mixture of sulfonamides considerably reduces the incidence of renal concretions; and (3) the compounds in a mixture of sulfonamides are absorbed and excreted independently of each other. Experimental evidence is presented in support of these statements.

A mixture of sulfathiazole, sulfadiazine, and sulfamerazine was considered most suitable. The mixture (sulfadital) was made in the following proportion: sulfathiazole, 37 per cent, sulfadiazine, 37 per cent, and sulfamerazine, 26 per cent. The authors believe that if such a mixture is used, and if, in addition, a high diuresis with alkalinization is produced, the risk of concrement formation in a normal kidney will be almost eliminated. This mixture has given good results clinically. F. J. LESEMANN, M.D.

Fowler, E. P., Jr., and Seligman, E.: Otic Complications of Streptomycin Therapy. *J. Am. M. Ass.*, 1947, 133: 87.

The authors call attention to the possibility of the occurrence of neurotoxic symptoms involving the vestibular and auditory systems following streptomycin therapy. They review the observations of other authors and report their own observations in the cases of 81 patients. They state that a high incidence of vestibular disturbance and a sizeable number of cases of deafness, either transitory or permanent, will occur with the use of streptomycin if large doses of the drug are given over prolonged periods.

The onset of otic symptoms usually occurs from the seventeenth to the twentieth day if 3 gm. of the drug per day are given. The patients in the majority of cases recover from the deafness, and even if the caloric response remains negative the accessory balance mechanism compensates well for the totally dead labyrinths, so that this need not be feared. The mechanism of these otic complications of streptomycin therapy is unclear as yet.

Because of the possibility of otic complications, it is believed that the use of streptomycin should be carefully considered, but that, when indicated, it should not be withheld because of this danger. The occurrence of otic symptoms during streptomycin therapy should call for a reconsideration of the case before continuance of therapy. The authors suggest that one audiogram and vestibular test be performed before the utilization of streptomycin therapy.

G. ALBIN LIVA, M.D.

ANESTHESIA

Burstein, C. L., and Alexander, F. A. D.: Anesthesia for Thoracic Surgery. Management in an Army General Hospital Overseas. *Anesthesiology*, 1947, 8: 36.

This communication is based upon observations made during anesthesia for 1,165 consecutive operations within the chest, with an overall mortality of less than 0.2 per cent. The more important specific problems in management are discussed. Completion of the surgical mission may be contributed to by anesthesia which protects the patient from untoward reflex changes, ensures ample oxygenation and carbon dioxide elimination by adequate ventilation, minimizes annoying motion of intrathoracic viscera, and results in as little disturbance of normal physiologic function as possible.

A technique of anesthesia intended to fullfill these requisites has been evolved by the authors during the conduct of cases in a military hospital. This technique consisted of rapid induction with a relatively large dose of pentothal sodium. In patients who had suffered recent hemorrhage, or were poor risks for any cause, the size of this dose was markedly reduced. Intubation was performed with a large bore Magill endotracheal tube with inflatable cuff (attached to a Waters to-and-fro canister of soda lime, and a bag). Anesthesia was maintained with nitrous oxide, oxygen, and ether, supplemented by continuous manual reinforcement of automatic inspiratory efforts—"compensated respiration." Various procedures to prevent untoward cardiocirculatory reflexes and peripheral circulatory depression were applied. This technique proved safe and satisfactory in the instances in which it was used.

The authors believe that the greatest single factor contributing to the success in these cases was the insistence upon absolutely rigid adherence to sound surgical practice, not the least part of which is teamwork which begets mutual confidence among all individuals concerned. MARY FRANCES POE, M.D.

Davison, T. C., and Letton, A. H.: Muscular Relaxation in Abdominal Surgery with the Use of Pentothal-Oxygen and Curare; Report of Over 600 Cases. *South. Surgeon*, 1947, 13: 15.

The results obtained by the authors at the Georgia Baptist Hospital, Atlanta, with the use of curare with pentothal-oxygen in abdominal surgery have been so gratifying that its use there is now surpassing that of other forms of anesthesia. The authors have compiled the pertinent facts in the cases of 609 major operations in which this method was used. For comparison, statistics were also compiled on a corresponding group of cases in which pentothal alone was used.

The drugs are administered by three-way stopcocks, and oxygen is given continuously. The addition of curare diminished the amount of pentothal used, by 19.3 per cent, and was undoubtedly the big factor in reducing the length of postoperative sleeping. In a few cases there was a drop in blood pressure. Artificial respiration was not indicated in a single instance. Phlebitis did not occur in any case.

The authors prefer the synergistic effects of pentothal-oxygen-curare in abdominal surgery. The induction is rapid, the effects pleasant for the patient, postoperative complications are lowered, and the danger of explosion is minimized.

MARY FRANCES POE, M.D.

Baird, J. W.: Pentothal-Curare Mixture. *Anesthesiology*, 1947, 89: 75.

The author describes the preparation of pentothal-curare mixtures for use in anesthesia. After numerous experiments with varying percentages of curare and combinations of buffers with the pentothal-curare mixture, the present formula was found most suitable: 2½ per cent aqueous pentothal sodium, 18.5 c.c., and d-tubocurarine, 1.5 c.c. (150 units).

This mixture shows no precipitation for 14 days, although the solution darkens with age. A freshly prepared solution of pentothal sodium is necessary to prevent the formation of a precipitate when higher concentrations of curare are used. Solutions over 12 hours old should be discarded. It is advisable to add the curare to the pentothal solution while it is being agitated, to avoid a precipitation at the point of contact of the two liquids.

In the opinion of the author, 5 to 7½ units of curare per cubic centimeter of solution is the correct concentration of curare. Pentothal curare anesthetics (alcoholic and aqueous) have been administered in more than 50 cases with varying degrees of success. The series includes the use of this mixture for patients on whom cholecystectomy, gastrectomy, colectomy, radical mastectomy, and plastic operations have been performed, and for passing an endotracheal tube preliminary to the administration of cyclopropane. One-half to 1 c.c. of the mixture was intermittently injected intravenously, as required, to maintain adequate muscular relaxation and depth of anesthesia.

It was noted that less pentothal was required in the cases in which the mixture was used than in some cases in which no curare was added to the pentothal solution. The curare solution obliterates many of the troublesome reflex movements which are seen during pentothal anesthesia. The period of recovery is usually shortened following termination of the anesthetic. Prostigmine was administered to patients to counteract an overdose of curare. Induction of anesthesia and recovery of the patient were without untoward incident. Muscular relaxation was adequate in all cases. Severe laryngospasm was not encountered even though the patient coughed when the glottis was stimulated by the endotracheal tube. The average amount of solution injected preliminary to passing the tube was 10 to 15 c.c. of the mixture.

MARY KARP, M.D.

Smith, S. M., Brown, H. O., Toman, J. E. P., and Goodman, L. S.: The Lack of Cerebral Effects of d-Tubocurarine. *Anesthesiology*, 1947, 8: 1.

No unanimity of opinion exists as to the central properties of curare. Animal experimentation can provide, at best, only a partial and indirect answer as to whether curare exerts a central depressant or analgesic action in man. Therefore, it was thought desirable to obtain the subjective report of a trained observer under the influence of curare alone and not undergoing a surgical procedure.

In a normal subject, a dose (500 mgm.) of d-tubocurarine chloride at least two and one-half times that required to cause complete respiratory paralysis failed to alter the electroencephalogram, or to impair consciousness, memory, or sensorium. Significant effects on systems other than skeletal muscle were also absent.

Neostigmine given in fairly large dosage greatly facilitated recovery from the curare-induced paralysis. Although 3.5 mgm. of neostigmine methylsulfate were given intravenously within a period of less than 2 hours, no significant muscular action on the gastrointestinal tract, urinary bladder, or cardiovascular system was observed, and atropine was not required. Curare is usually considered to have no direct blocking action on smooth muscle cells. The stimulant effect of neostigmine on the constrictor of the pupil and on the secretory glands was abundantly evident. Neostigmine had no discernible central effect on the nervous system, and the electroencephalogram was not altered.

It is suggested that if curare is to be used properly as an adjuvant in anesthesia, its inability to depress the central nervous system be kept clearly in mind. Its sole action of value in anesthesia is to produce skeletal muscular relaxation by the peripheral paralytic effect on end-plates of skeletal muscle cells. It should be employed only as an adjuvant with agents capable of relieving pain and obtunding consciousness. Failure to appreciate the limitation of curare may bring this very valuable agent into undeserved disrepute.

MARY FRANCES POE, M.D.

Dripps, R. D.: The Immediate Decrease in Blood Pressure Seen at the Conclusion of Cyclopropane Anesthesia: "Cyclopropane Shock." *Anesthesiology*, 1947, 8: 15.

The etiology of the decrease in blood pressure not infrequently noted at the conclusion of cyclopropane anesthesia has been investigated. The usual sequence of events is as follows:

The blood pressure during anesthesia is elevated above the preoperative level. When the mask is removed, both systolic and diastolic pressures decrease, the rate and extent of the decline being variable. In those patients showing an immediate and precipitous fall in blood pressure, the skin becomes clammy, the pulse is of poor volume, and emergence delirium is profound. It is to this condition that the term "cyclopropane shock" has been applied.

Certain facts seemed to fit together to provide a logical explanation for the phenomenon. It has been established that cyclopropane anesthesia is associated with a respiratory acidosis, which is ascribed to the accumulation of carbon dioxide. Secondly, it is known that sudden cessation of rebreathing is accompanied by a prompt decrease in the blood pressure level, the diastolic pressure being decreased more than the systolic. Finally, it has been demonstrated that loss of carbon dioxide is often associated with a diminution in blood pressure in the anesthetized man and animal. It is apparent that the buffer mechanisms are sufficiently active to maintain the nervous control of the cardiovascular system unless they are partially or completely inactivated by a depressant drug.

The hypothesis was thus formulated that the rise in blood pressure or the maintenance of circulation under cyclopropane anesthesia was related to carbon dioxide retention secondary to the respiratory depressant action of the drug. When the respiratory depressant was removed at the conclusion of the

anesthesia, an elevated carbon dioxide tension in the arterial blood would diminish and the blood pressure also would fall.

The results of clinical studies give evidence in favor of the hypothesis. The possibility has been considered that other physiological imbalances secondary to the closed system method of administration may be concerned in the postoperative decrease in blood pressure.

Certain practical considerations arise if this theory is proved correct. First, the nature and amount of the preoperative narcotic becomes important. Second, it is apparent that the sequence of events leading up to this postcyclopropane hypotension is more the fault of the anesthetist than the anesthetic. Third, some clinicians have learned to minimize this postcyclopropane decrease in blood pressure by utilizing semi-open techniques with rapid flows of nitrous oxide-oxygen during the last 5 to 15 minutes of a prolonged cyclopropane anesthesia. Fourth, it might be of interest therapeutically to attempt to control this hypotensive reaction by using carbon dioxide inhalations during the period of emergence from anesthesia. Treatment of this condition, in the opinion of the authors, consists essentially of its prevention through maintenance of an adequate respiratory exchange. MARY FRANCES POE, M.D.

Leech, B. C.: Safety Measures in Anesthetics. *Canad. M. Ass. J.*, 1947, 56: 28.

Explosions and fires have occurred in operating rooms due to the explosibility and inflammability of many of our most useful anesthetic vapors and gases. "Static" sparks (more common in a dry atmosphere) form probably the greatest hazard. Common sense and alertness to the hazards are the best safeguards.

Characteristic of all presently available local analgesic drugs is that an individual overdose produces clonic muscle spasms and possibly full-blown generalized convulsions. An intravenous barbiturate, sufficient to relax the muscles, is considered the best antidote, and may promptly allay the convulsions before the respiratory and heart muscles become affected. Pentothal sodium given intravenously in a 2½ or 5 per cent solution is effective. Possibly intravenous curare may prove to be even more effective.

No spinal anesthetic is ever given without frequent blood pressure readings, or without a vasopressor drug at hand, in order that blood pressure may be maintained within reasonably normal levels throughout the operation. A very dilute solution of neosynephrine or methedrine intravenously is used. Adrenalin is avoided because of its reputed danger in association with cyclopropane, which is often used as a supplement.

The strength of pentothal sodium now recommended is 2½ per cent for ordinary methods of use; for the continuous intravenous drip technique, 0.3 per cent is satisfactory. The author stresses a few specific "don'ts" for pentothal safety.

Endotracheal intubation is a procedure that every anesthetist must master, for such a maneuver has been lifesaving. Whole blood transfusion should be anticipated and made ready for extensive procedures. Plasma should be constantly on hand both as an emergency substitute for blood and for conditions in which it is particularly indicated. Electrolyte solutions must be in generous supply and ready for immediate use. For long or serious operations, the author feels sure the happiest anesthetist is the one who has an intravenous drip running and his patient intubated, for he is then in a masterful position.

It is thought that curare is among the safety agents of the modern anesthetist's armamentarium, for it is a relatively safe agent which will produce complete muscular relaxation for a short period and can be safely repeated as needed. From the standpoint of safety, it should be stated that the sometimes serious laryngospasm, which causes respiratory embarrassment, can be temporarily overcome by the use of curare.

Suction as a safety measure to the anesthetist has a value which can scarcely be overestimated.

Today anesthetists believe that unduly shallow or slow respirations usually need only the mechanical augmentation which can be easily supplied. The patient who has a good pulse, but whose respiratory movements, either by accident or by design, have ceased entirely can be adequately supported by the simple method called "controlled respiration."

While failing circulation can usually be dealt with, actual cardiac arrest is quite a different matter and is usually irreversible. The generally advocated emergency measures are reviewed.

A recovery section probably is the best answer to the problem of early postanesthesia care, the most dangerous period being that immediately following the patient's return to bed, when adequate supervision may be lacking. MARY FRANCES POE, M.D.

Schildt, E.: Low Spinal Cord Injuries following Spinal Anesthesia. *Acta chir. scand.*, 1947, 95: 101.

From the time that spinal anesthesia was first used, there have been reports of complications of the nervous system. Following a discussion of the pharmacology of the various spinal anesthetic drugs, the author reviews the literature and presents the material which he has collected through questionnaires concerning complications of the central nervous system.

While reviewing this material the author encountered many studies of up to a few thousand cases in which there were no complications. This fact is mentioned as a counterbalance against the alarming series presented. Experimental studies show that tropacocaine, novocain, alypin, and stovaine in certain cases cause definite spinal cord lesions. The disturbances are either reversible or permanent. The injuries are located in the spinal cord and are most marked near the site of injection. Nerve roots and spinal ganglia are spared as a rule.

The author found in the literature reports of meningeal reactions following the use of most all of the local anesthetic agents. The reactions are usually

very mild and transient, and only in exceptional cases does the meningeal irritation reach an alarming degree.

Low lesions of the spinal cord usually manifest themselves through phenomena of irritation or loss of function. The symptoms may appear at once, or may become noticeable only after days or months.

The author collected some valuable material as a result of his questionnaire sent to 121 hospitals. It was deduced that the number of spinal anesthetics used per year, for the whole country of Sweden, may be estimated at between 25,000 and 30,000. During the period from 1943 to 1945, there were 6 definite cases of severe postanesthetic injury, a frequency of about 0.01 per cent. Hypobaric percaine was used much more frequently than novocain, decicaine, or tropacocaine.

The 6 cases of postanesthetic damage of the nervous system are reported in detail. The probable cause of injury to the spinal cord is the chemotoxic effect of the anesthetic. The effect on the myelon is proportional to the strength of the anesthetic solution as well as to the injected volume. Because so few people are affected there may exist a rare individual sensitivity.

In a few cases marked and severe pain appears during the injection of the anesthetic. In the event of severe pain, it is strongly recommended that the injection be discontinued and that, if possible, the operation be postponed.

The advantages of a well given spinal anesthetic are still great and easily counterbalance the small risk of postanesthetic injuries. However, according to the author, the indications for spinal anesthesia should be more rigid. Another less harmful anesthetic should be substituted whenever possible.

EDITH EASON, M.D.

Bailey, H.: Impending Death under Anesthesia. *Lancet*, Lond., 1947, 1: 5.

Experience has taught that cardiac arrest can occur in any patient, with any anesthetic agent, and any anesthetist. For obvious reasons, a general emergency surgeon is more often confronted with impending death under anesthesia than is the surgeon engaged in special branches.

Two fundamental conditions are segregated: blue asphyxia (primarily respiratory) and white asphyxia (primarily cardiac). The latter is far more serious. After 20 years' observation, the author has now abandoned expending time in the performance of artificial respiration and the injection of adrenaline into the ventricle. He recommends immediate cardiac massage when the heart stops. The current plan of action includes intermittent compression of the ventricles through the diaphragm within 1½ minutes after the stoppage occurs. It appears that the early anxieties and later complications that follow temporary cardiac cessation are proportional to the length of time the organ is functionless.

The time limit for successful cardiac massage is a great deal longer in cases in which the heart has ceased to beat after blue asphyxia, as the cerebral mechanism is not deprived of blood.

In sudden cases of vasomotor collapse, when a pint or more of fluid must be put into circulation in a matter of minutes, injection by syringe (not by gravity) into the bone marrow is a method that has yet to be bettered. This method is advocated by the author for use in desperate crises.

MARY FRANCES POE, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Wynn, S. K., and Macomber, D. W.: Practical Points in Wolfe Graft Technique. *Surgery*, 1947, 21: 86.

The authors review their experiences in over 100 cases in which they employed a thick graft of this type. Because this graft is more durable, shrinks less, and provides a better color match, they have elected the Wolfe graft whenever the defect has been not too extensive, the recipient area favorable enough, and the best appearance and greatest durability are desirable.

The choice of the donor site is most important when the defect is on the face. It is generally believed that the upper eyelid and postauricular tissues provide the most perfect quality and color matching for small facial defects, and for larger areas the lower neck or clavicular region is superior. The remaining defect is treated with undermining and closure, or by a split skin graft. The inside surface of the upper or lateral thoracic wall provides good quality skin, but the color is less favorable.

Thigh skin provides a useful Wolfe graft. It is advocated that donor skin for a defect upon the dorsum of the nose may match much more accurately if a split graft is removed from the donor site and allowed to heal prior to the main operation. This gives the area an orange peel appearance, and is especially important if the individual has enlarged pores. Usually 3 weeks following the removal of the thin graft, the full thickness graft can be cut to pattern from this natural appearing donor site.

Since the graft is nourished from the base rather than from the edges, its recipient bed must be clean and vascular. Gentle, firm, and constant pressure should be maintained following the removal of stitches and the early dressings, for a period of 3 weeks or more.

It is believed that the Wolfe graft should be cut approximately 20 per cent larger, to allow for inevitable shrinking and to avoid tension at its periphery. The authors prefer to cut a pattern beforehand. When the graft is dissected from its donor site, every morsel of subcutaneous fat is removed from its under surface; in fact, a bit of the corium is commonly removed in order to be certain. They stress the use of straight scissors, absolute hemostasis with nonabsorbable suture, the use of adrenalin solution locally, and suturing with interrupted material. They favor pressure dressings with a pattern tied in place by sutures and covered by a large dressing, if possible.

In considering eyebrow grafts they feel that the scalp graft for making an eyebrow is an exception to the rule that the free graft is utterly dependent upon its base, rather than its edges, for nutrition. Two or three long narrow grafts, placed side by side at intervals of 10 days or more, result in survival of more hairs, especially if the knife blade is inserted into the donor area and drawn parallel to the hair shafts while taking the graft. It is a familiar fact that the hair, or hair roots, within the graft at the time of transfer usually are shed. Then a certain per cent of the follicles survive and produce new hair. It is noted that often more hairs survive near the borders of the graft, and a higher percentage survive in a slender graft than in a wide one. Knowing that bold thinning on the deep side of this graft destroys many hair follicle bulbs, they find that less bold thinning and a narrower graft begets a greater per cent of viable follicles. These observations indicate that substantial nutriment reaches the graft from its side.

The postoperative care is meticulous. Face grafts are not dressed for 5 days unless necessary, and the stitches are removed at that time. Elsewhere the dressing may be left undisturbed for 10 days or so. The mold made at the original operation is replaced and pressure maintained for 3 to 4 weeks, until most of the shrinking has stopped and the graft is beginning to assume a natural color. By the end of 6 to 8 weeks, it is frequently possible to evaluate the success of the original grafting procedure and plan any corrective procedures.

Complications, which may be noted at initial dressing, and a method of treating them are as follows:

1. Blebs on the graft. These should be opened, fluid expressed, and 20% mercurochrome applied.

2. Separation of the suture line. This should be reapproximated by strips of flamed adhesive.

3. Hematomas under the graft. If at the edge, it is evacuated by simple expression and the edge reapproximated by adhesive. If not at the edge, it is best evacuated by a stab wound.

4. Serum under the graft. This is treated the same as hematomas.

5. Areas of necrosis. It is best to await separation, then remove by small scissors, and dress with a single-ply, fine mesh, scarlet red gauze, over which the usual pressure dressing is reapplied.

6. A remote, unpredictable, and uncontrollable complication in some cases is pigmentation of the graft.

LeRoy J. Kleinsasser, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Robbins, L. L.: The Technique of Roentgenological Demonstration of Pulmonary Infarcts. *Am. J. Roentg.*, 1946, 56: 736.

Contrary to experience elsewhere, pulmonary infarction constitutes one of the two most common postoperative complications at the Massachusetts General Hospital, Boston.

Since pulmonary infarction often is the first sign of an impending massive fatal embolism, and in view of the fact that certain preventive measures are now available, an early roentgen demonstration of such a complication is important.

The author describes a technique of roentgen examination which permits an early diagnosis of pulmonary infarcts. Unless the patient's condition forbids, the examination is started by roentgenoscopy. This is done with a high kilovoltage, approximately 85 to 89 kilovolts, and a low milliamperage, to save the skin from overexposure. After the infarct is located spot roentgenograms, similar to those of the gastrointestinal tract, are taken in at least two different projections with the same kilovoltage and a very short exposure. A posteroanterior roentgenogram is always advisable and if spot films cannot be made, lateral and oblique roentgenograms are of additional value.

If a patient is too ill for roentgenoscopy, a ceiling floor-mounted tube stand is of great value. The bed with the patient is pushed beneath this tube and a roentgenogram is made at 6 foot distance. Such a procedure is much better than a portable examination in the patient's sick room. The technique of exposure is along the same lines as for the spot films. A rotating anode, which provides a small focal spot, is used with high milliamperage and short exposure. Merrill worked out a modification of Fuchs' technique establishing optimum kilovoltage for the part to be examined and variation of milliampere-seconds with the size of the patient. The factors are expressed in the following table:

TABLE I.—CHEST EXAMINATION

300 ma. 72 in. distance

Size Chest	Posteroanterior		Oblique		Lateral	
	cm.	sec.	cm.	sec.	cm.	sec.
Small	19	1/60	23	1/20	26	1/15
Average	20–25	1/30	24–30	1/15	27–32	0/10
Large	26–29	1/20	31–33	1/15	33–	1/11
Huge	30–	1/15				
	68 kv.		75 kv.		80 kv.	

Roentgenograms taken with this technique are steel gray, showing poor contrast but of distinct value in diagnosing infarcts. Bronchograms and laminograms have proven of little or no value.

Differential diagnosis includes bronchopneumonia, metastatic malignancy and, during the healing stage of the infarcts, linear shadows of atelectasis. If the infarction has produced a diminution in the size of the affected lobe, the possibility of a primary carcinoma of the lung must also be considered.

T. Leucutia, M.D.

Lindgren, E.: Roentgen Diagnosis of Arteriovenous Aneurysm of the Lung. *Acta radiol.*, Stockh., 1946, 27: 585.

For practical purposes, the term arteriovenous communications is used to include arteriovenous aneurysm, cirsoid aneurysm, pulsating angiomas, and simple angiomas. The symptoms of these lesions are generally circulatory and local and they depend on the location of the abnormality. Central lesions generally lead to cardiac manifestations or sudden death. Peripheral lesions result in a gradual enlargement of the heart and dilation of the involved artery.

Three cases of arteriovenous aneurysm of the lung are reported. Two of these cases were diagnosed before operation; surgery was not performed in the third case. The clinical findings were cyanosis, clubbing of the fingers, dyspnea, sensations of weight or pain in the chest, and hemoptysis.

The anatomopathological findings in arteriovenous aneurysm are classical in that the distended afferent artery and distended efferent veins are clearly seen. There is either a direct communication to one or several larger vessel trunks or a tangle of more or less distended vessels rather than capillaries. As the arterial pressure is transmitted to the malformed vessels and into the veins, these become increasingly dilated. Degenerative changes take place in the walls and eventually some of the vessels rupture. In time new pathological communications will be produced.

Roentgen findings reveal a broad, band shaped density which is connected with the hilar vessels; in the periphery, the latter communicate with one another. The vascular formations are more or less rounded and resemble tumors. The vessels lie in different planes; this is best demonstrated in the lateral view or by fluoroscopy. The arteries are less distended than the veins and the aneurysm is most distended of all. Larger aneurysms may simulate tumors. Arteriovenous aneurysm communicates with the hilus and decreases in size with the Valsalva maneuver (forced expiration with the closed glottis). The Muller test increases the size of the aneurysm. In some instances it is necessary to distinguish an arteriovenous aneurysm from a tuberculous process, other inflammations, atelectasis, and infarcts. Calcification in the aneurysm was not observed by the author. Pulsation had been observed at the time of operation, although not at the time of fluoroscopy.

Valuable adjuncts to the routine fluoroscopic roentgenographic studies are contrast visualization and laminagraphy. The author is of the opinion that the congenital arteriovenous communications do not give rise to cardiac enlargement.

MAURICE D. SACHS, M.D.

Ramos, A. G. P., Guitarte, A. I., and Bianchi, A. A.: Peritoneal Pneumoradiography in Gynecology (La neumorradiografía peritoneal en ginecología). *Bol. Soc. obst. gin. B. Aires*, 1946, 25: 196.

In gynecological problems, when circumstances prevent careful and complete diagnostic examination, peritoneal pneumoradiography is most helpful. It is a relatively simple procedure, causes a minimum of discomfort, and is free from major complications. It gives a good pelvic panorama.

This article gives the technique used by the authors and presents the case reports of 10 peritoneal pneumoradiographies and 2 hysterosalpingographies in combination with the pneumoradiographies.

Carbon dioxide was employed because it does not resorb as rapidly as oxygen or air.

Illustrations demonstrating the appearance of pathological conditions such as ovarian cysts, hydrosalpinx, the pregnant uterus, as well as normal pelvic structures, are presented.

The authors consider the procedure definitive, and an extremely useful diagnostic adjunct in difficult gynecologic cases. STEPHEN A. ZIEMAN, M.D.

Belgrano, V., and Gardella, G.: Para-Articular Ossifications (Ossificazioni para-articolari). *Radiol. med.*, Milano, 1946, 32: 422.

Twenty-three cases of post-traumatic para-articular ossification and 1 case following a medullary lesion with resulting paraplegia are reported by the authors. Four patients were younger than 20 years and among them was 1 boy 5 years old. The authors believe that according to the literature this was the youngest patient on record in whom a post-traumatic para-articular ossification occurred.

The ratio of contusions, dislocations, and fractures followed by ossification was 8 to 7 to 8.

In 4 cases the ossified tissue was removed and in 2 of them the macroscopic examination and histologic studies demonstrated a close relationship to the articular capsule which undoubtedly served as a source of bone formation. Post-traumatic para-articular ossification may be caused by a metaplasia of periosteum, ligaments, articular capsule, or other para-articular tissues. Such processes are stimulated by forced mobilization of the rigid articulation, passive movements, and rough massage.

Several conditions must be considered in the differential diagnosis. Para-articular ossification shows a trabecular structure in roentgenograms while calcifications cast a homogenous shadow. Pictures taken in various directions may detect an origin from the bone suggestive of a hypertrophic callus, an osteosarcoma, or an exostosis. Para-articular ossification or so-called Pellegrini-Stieda's disease affects the elbow chiefly. Clinical symptoms may be absent; a calcareous or osseous structure is demonstrable, the condition is usually stationary, and the site of the changes is usually an articular ligament.

On the other hand, regressive calcareous periarthritis, or Duplay's disease, is usually located in the shoulder region and creates a well defined clinical picture. The structure of the pathologic formations is amorphous; roentgenologically, a rapid regression of the process may be demonstrated and the changes are located in the serous bursae, in the insertion of tendons, and in para-articular tissues. Trauma cannot always be found in the history, contrary to the findings in para-articular ossification.

The process reaches the "stage of maturity" when the roentgenographic shadow has sharp outlines and the density remains unchanged in pictures taken at certain intervals.

In 15 of 23 cases observed by the authors the condition was located in the elbow; in 5, in the knee; in 2, in the scapulohumeral articulation; and in 1 case, at the ankle articulation. Only 1 patient belonged to the female sex. In 1 patient with a fracture of the ninth and tenth dorsal vertebrae followed by paraplegia, the roentgenograms disclosed para-articular ossifications in the paratrochanteric regions of both femurs and both knees.

Traumatic, chemical, and toxic factors have been attributed to para-articular ossification. Among the chemical factors, the decalcification of bone plays the main role. Patients with paraplegia usually suffer from an atony of the digestive tract with a resulting increase of the bacterial flora and absorption of endotoxic products. Hypercalcemia combined with trauma and such toxic products may cause the formation of new bone. Mechanical irritation of the edematous tissues has been accepted as a responsible factor by Freund.

Prophylaxis consists of gentle reduction of dislocations under deep anesthesia. The after treatment should consist of a gentle, nontraumatizing massage. Similar principles should be followed in the treatment of fractures. An infiltration of the affected ligaments with novocain, repeated whenever necessary, is indicated in order to eliminate stimulation of hyperemia, organization of connective tissue, rarefaction of epiphyses and hypercalcemia. Anesthesia diminishes pains and allows early motions. Immediate immobilization of the injured limbs excludes irritation, alleviates pain, and accelerates absorption of extravasated blood. Slight compression for the same purpose is desirable. Diathermy improves the local circulation and accelerates absorption of the hematoma. X-ray therapy diminishes the tendency toward ossification but only in early stages.

As a rule, the "stage of maturity" is reached within 6 to 12 months after the injury. Surgical treatment is indicated not before this stage has been reached and only if limitation of motions is present and conservative therapy consisting of diathermy, gentle massage, and active mobilization has failed.

JOSEPH K. NARAT, M.D.

Cade, Sir S., Scarff, R. W., Golding, F. C., and Adams, S. B.: Discussion on Primary Malignant Tumors of Bone (Symposium). *Brit. J. Radiol.*, 1947, 20: 10.

Cade has suggested the following simple grouping for the classification of bone sarcoma. The percentage, sites of origin, and the radiographic findings are included:

Osteogenic sarcoma (50%). Metaphysis, rarefaction, sclerosis, new bone formation, Codman's triangle, and sunray spicules.

Ewing's tumor (12.5%). Diaphysis, sclerosis of cortex and medulla, "onion peel," new bone, and patchy rarefaction.

Multiple myeloma (30%). Medulla of diaphysis, bone destruction, no compensatory new bone formation.

Parosteal sarcoma (15.0%). Diaphysis, erosion from outside, osteolysis, irregular calcification in soft tissue.

To this group is added a fifth type which is nearly always benign in its clinical course:

Osteoclastoma (20%). Epiphysis, expansion, and thinning of cortex, trabeculation, no new bone formation.

The balance between bone destruction and bone formation and the direction of the spread of tumor cells explain the variation in the x-ray appearance. Sunray spicules are not always diagnostic of osteogenic sarcoma, nor are the "onion peel" layers an infallible sign of Ewing's tumor. These changes may be produced by nonmalignant lesions.

Ewing's tumor is believed to be the most radiosensitive type, and parosteal sarcoma is believed to be the least sensitive type. Osteogenic sarcoma varies. Some sarcomas of this type are very sensitive, others are resistant. Adequate irradiation may produce all or none of the following effects: progressive shrinkage of the tumor, recalcification of osteolytic lesions, resorption of abnormal bone, healing of pathological lesions, restoration of normal bone contour, and histological evidence of arrest of neoplastic growths. These changes, however, are not permanent; local recurrences are the rule rather than the exception.

Preoperative irradiation is always given in cases of osteogenic sarcoma. If the response is satisfactory, amputation is postponed; if no response is noted the irradiation is thought to have sufficiently inhibited the activity of the tumor so that the delay has in no way altered adversely the patient's life expectancy. F. M. Allchin, at Westminister Hospital, uses these factors: 200 kilovolts, 2 mm. copper plus 1 mm. aluminum filter, 300 roentgen divided daily tumor dose in a total average time of 5 weeks, and total tumor dose of 3,000 roentgens.

Ewing's tumor usually responds rapidly, though permanent regression is seldom achieved. Local recurrences are unusual if adequate irradiation has been given. Multiple metastases are the common final manifestation. In the absence of metastasis, local recurrence is an indication for amputation.

Multiple myeloma is invariably fatal. Irradiation in small doses is the best palliative procedure for the relief of pain.

Parosteal sarcoma is radioresistant. Surgical treatment is the method of choice. Postoperative irradiation to the stump is of value.

Osteoclastoma may be treated by conservative surgery or by irradiation. Surgery is preferred (1) in young children when the tumor is in close proximity to the epiphyseal line; (2) in tumors of moderate extent, when the destruction of bone is limited and the cavity which is left by curetting is small; (3) in tumors of the digits; and (4) when the tumor has extended to the neighboring joint and irradiation will have to include articular and periarticular structures. Irradiation is indicated (1) in healthy adults, (2) in all patients when the tumor is difficult of access, and (3) in accessible tumors when the destruction of bone is great and pathological fracture is likely to follow curetting. The combination of curettement and irradiation is not advisable. Irradiation of postoperative recurrences is less successful than primary irradiation. The x-ray therapy factors include 200 kilovolts, 1.5 mm. of copper, and 1 mm. aluminum filter. The daily skin dose for adults is 200 roentgens, and for children 150 roentgens, in an average time of 4 weeks. The total tumor dose for adults is 2,000 roentgens, and for children, 1,200 roentgens. A second series of treatment is given after a period of 6 months, and a third series after 18 months.

The role played by a single injury in the production of malignant disease has been largely abandoned. However, Scarff states that there remains considerable evidence in favor of trauma as an etiological factor in sarcoma of bone, and angioendothelioma.

Although much has been written against the principle of biopsy, there is no real evidence to show an increased liability to metastasis following such a procedure. Histology is of great importance not only in diagnosis but also in the prognosis and treatment. Since the evidence against such a procedure is largely one of impression, it is believed that the advantages leave no choice in the matter. In fact it is no more dangerous than palpation.

Scarff's classification of bone tumors omits parosteal sarcoma per se, as well as osteoclastoma, but includes infiltrating chondroma, extraperiosteal fibrosarcoma, medullary fibrosarcoma, angioendothelioma. and chordoma.

While most neoplastic lesions show some correlation between the histology and the subsequent behavior of the tumor, osteogenic sarcoma has thus far failed to behave in such a fashion. Some highly dedifferentiated lesions showing rapid growth, appear to have been completely eradicated by amputation, while slow growing, well differentiated lesions show no response either to surgery or x-ray therapy. Periosteal fibrosarcoma and medullary fibrosarcoma offer a somewhat better prognosis than osteogenic sarcoma, hence should be classified separately.

The roentgen diagnosis of bone tumors is fraught with difficulties. Since the average roentgenologist

cannot hope to have a large personal experience, he must rely upon the literature. Goulding does not believe the latter to be too reliable. For example, giant-cell tumors are supposed to originate in the epiphysis, yet he has never seen this tumor in the epiphyseal end of the bone until after the epiphyseal line has closed. In adolescents, before closure of the epiphysis, these tumors are found in the metaphysis. Moreover, some giant-cell tumors bear a close resemblance to central osteolytic lesions such as cysts, medullary sarcoma, fibrosarcoma and, to a less extent, chondroma, fibroma, plasma-cell myeloma, and even adamantinoma. Many of these supposedly "trabeculated" tumors have no trabeculations. From the roentgenologist's viewpoint at least, a period of observation and the clinical course of the lesions is often the only true indication of its nature. Almost all of the progress which may be made in exact diagnosis of the lesion is dependent upon the pathologist.

Adams has reported 4 cases of osteogenic sarcoma in which both pre- and postirradiation biopsies were performed. Diminution in the size of the tumor and histological evidence of radiosensitivity were shown in all 4 cases. Radiosensitivity was manifested by a marked relative absence of mitotic figures, many swollen nuclei and a greatly increased number of giant cells. Relief of pain is a most gratifying accompaniment of the irradiation. The swelling in cases of osteogenic sarcoma regresses much more slowly than in Ewing's tumor. R. B. LEWIS, M.D.

MISCELLANEOUS

Mitchell, J. S.: Applications of Recent Advances in Nuclear Physics to Medicine. *Brit. J. Radiol.*, 1946, 19: 481.

Recent advances in nuclear physics which led to development of the atomic bomb also provide a method for preparation of large amounts of radioactive isotopes. These should be used in medicine as follows: (1). Radioactive tracers in the study of metabolic processes, pharmacology, and therapeutics; (2) radiation therapy; (3) selectivity of certain isotopes for particular cells and tissues to serve a therapeutic agent.

The "pile" serves as the sources of radioactive isotopes. Tracers will undoubtedly lead to new developments in all branches of medicine. The isotopes used should have a reasonable half of life period. Concentration of the isotopes should not be too high. Phosphorus 32 and carbon 14 are two of the many isotopes being studied.

The "pile" may also serve as a source of gamma radiation in radiotherapy. Radiocobalt 60 with a half-life of 5.3 years, and tantalum 182 with a half-life of 97 days are some of the isotopes being considered as a source of therapy.

Some isotopes have a selective concentration for certain tissues and may be used as a therapeutic agent. Phosphorus 32 has been used effectively in the treatment of leucemia, lymphosarcoma, and polycythemia. Iodine 131 is used in thyroid diseases.

The cyclotron produces isotopes too, but in smaller numbers. However, with the cyclotron it is possible to prepare radioactive isotopes in a state of high concentration. Cyclotron has the advantage over the "pile" in being able to prepare substances such as sodium 22 and iron 55. In some instances in which the isotope has a short half-life or the quantity desired is small, it is more practicable to use the cyclotron.

The "pile" has the advantage of either being able to produce isotopes in large quantity or small amounts in high concentration. Then, too, fission products, such as iodine 131 can be used in radiation therapy. The "pile" cannot compete with the cyclotron as a source of fast neutrons whose high energies are used in the treatment of deep-seated malignancy. For practical purposes, the "pile" has the following disadvantages: it is difficult to position patients; it is isolated; it produces whole body radiation which is a problem to control; and it is difficult to collimate the beam. MAURICE D. SACHS, M.D.

Hertz, S., and Roberts, A.: Radioactive Iodine in the Study of Thyroid Physiology. The Use of Radioactive Iodine Therapy in Graves' Disease. *West. J. Surg.*, 1946, 54: 474.

The authors' article is the seventh of a series. In the previously published 6 articles, they dealt with tracer studies of radioactive iodine in animal and human thyroid physiology and iodine metabolism. The present article is a 3 to 5 year follow-up report of a group of 29 patients with Graves' disease who were treated by internal irradiation with radioactive iodine.

The samples of radioactive iodine were obtained by deuteron bombardment of tellurium in the cyclotron. Over 90 per cent of the activity consisted of the 12.6 hour I^{130}, and most of the remainder of the eight day I^{131}.

The dose, which was administered orally in the form of sodium iodide and without any preliminary iodinization, varied between 0.7 and 28 millicuries. In 19 cases a single dose, and in 10 cases multiple divided doses were given. In order to insure maximum collection in the thyroid the total iodide administered was kept below 2 milligrams of iodine.

It was found early that the maximum excretion of the radioiodine occurred in the urine during the first 72 hours. A quantitative determination of the radioactive iodine content of the carefully collected (iced and corked) urine, therefore, gave an indirect estimate of the thyroid retention of the radioactive iodine. In a few cases, external gamma ray counter measurements were also made.

The administration of the radioactive iodine was followed within from 1 day to several weeks by routine iodinization of the patients with a saturated solution of potassium iodide given in doses of minims twice a day. This was continued, as a rule, for a period of 2 to 4 months until an essentially normal basal metabolic rate was obtained. A rise of the basal metabolic rate upon cessation of the iodinization was considered as failure of the radioactive iodine therapy.

An attempt was made to express the radiation dose in the equivalent roentgen unit by applying the following formula:

$$\text{Radiation (in roentgen units)} = \frac{10{,}000 \text{ (Dose of } I^{130} \text{ in mc) (fractional uptake in thyroid)}}{\text{weight of thyroid in grams.}}$$

For I^{131}, the constant 10,000 is replaced by 117,000.

Thus, for I^{130}, a net collection of 3 millicuries in a thyroid of 30 grams weight will give a total of 1,000 roentgens in decaying to zero. The initial rate of such irradiation is 55 roentgens per hour. For I^{131}, it is only 3.6 per hour. However, an error of 50 per cent or more may be expected.

The results obtained in all 29 cases are summarized in tables. The treatment was considered a failure in 9 cases; the remaining 20 patients were apparently cured. Of the failures, 5 patients were subsequently operated upon and all developed postoperative hypometabolism.

The following clinical considerations are important: (1) there should be no previous iodine therapy; or, if such therapy has already been undertaken it should be stopped for a period of at least 1 month to allow maximum uptake of the radioactive iodine; (2) availability for close follow-up; (3) routine iodinization, starting from 1 to 3 days after the administration of the radioactive iodine; and (4) large goiter with secondary involutional changes should be submitted to surgery on a purely mechanical basis.

In patients receiving radioactive iodine therapy, a short period of hospitalization is necessary for the usual preliminary clinical studies and the administration of the isotope. After that the patient is fully iodinized and released, to be followed up as an ambulatory case.

The conclusion is drawn that radioactive iodine, when given in doses of 5 to 25 millicuries to uniodinized patients with Graves' disease, possessing goiters of 60 to 75 milligrams, produces a cure in about 80 per cent of the cases. T. LEUCUTIA, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Cameron, G. R.: Sudden Shifts of Body Fluids. *Proc. R. Soc. M.*, Lond, 1946, 40: 1.

When a highly irritant liquid, such as lewisite or mustard gas, is dropped on the skin, a blister forms in a few hours as a result of the localized outpouring of blood plasma from the vessels of the affected part, detaching the avascular epidermis from the underlying vascular dermis. Previous investigations suggested that damage to the skin liberated proteolytic enzymes which were responsible for loosening of the basement membrane.

Such injury also produces a systemic circulatory upset, manifested by a decline in the plasma volume as estimated by photometric methods. If this state is sufficiently severe, death from "shock" may ensue. Other associated changes are: a rise in hemoglobin percentage, red cell count, and packed cell volume (hematocrit per cent), indicating a concentration of blood. The plasmalike fluid collects in the irritated tissues and produces an edema. The diminished circulating plasma volume and plasma proteins result in a functional renal upset with a consequent elevation of the blood urea level. A mild secondary anemia, as a rule, also occurs.

Irritating gases, such as phosgene, lewisite, and mustard vapor, when inhaled, present a picture of local fluid loss similar to that described above. This results in pulmonary edema with acute mechanical anoxia. Phosgene as such is not absorbed into the blood and therefore does not lead to serious systemic complications through its inherent chemical properties. Thermal burning produces the same disturbance in a more rapid manner, as does the subcutaneous injection of large amounts of a hypertonic solution of glucose or saline. Thus, no matter how it is induced, acute anhydremia leads to the picture described above.

By cannulating the lymphatics of the involved area, and by determining the thoracic duct flow, it was found that some of the lost fluid and protein is returned to the circulation by way of the lymphatics. This form of compensation is of limited value and may even be deleterious by introducing harmful chemicals into the blood stream.

The rapid appearance in the injured tissues of a fluid rich in proteins signifies that the filtration membrane (capillary wall) had let through these large molecules in a quite unusual fashion. This was corroborated by experiments showing that after the application of lewisite or mustard gas to the skin, the capillaries become more permeable to a dye such as T. 1824, which combines with plasma albumin.

The author believes that Menkin's leukotaxin and the histaminelike substance of Lewis, produced in tissues damaged by mustard gas, are no doubt the intermediaries bringing about the capillary wall change which underlies increased permeability for plasma proteins. Anoxia increases the permeability of capillaries, as shown by Landis and Drinker.

Whether the alteration is a physical or chemical one in the surface membrane of the lining endothelial cells of the vessels, or a loosening of the cement substance which binds together these cells, and whether living processes are concerned is all conjecture. The remarkable studies of Peters and Dixon on enzyme chemistry and chemical warfare agents have opened up a new way of approach to the permeability problem, which may bring the solution.

DAVID H. LYNN, M.D.

Melman, E. P.: Concerning the Erethic Form of Traumatic Shock. *Vrachebnoe Delo*, 1946, No. 9, 643.

Experimental work on induced shock in animals and the many observations of injury on the field of battle have enabled the author to differentiate two different manifestations of primary shock: the erethic and the torpid forms. The injured man with the erethic form of primary shock is excited and pale, and he complains of the discomfort of his position and the pain in his wound. Nevertheless, despite huge wounds of the organs he struggles to get up from the litter on which he has been placed and continuously beseeches the attendants to bring him to the dressing stations or to evacuate him further to the rear. Some of these patients refuse the help of the hospital corps and come by themselves for treatment. At the dressing station the discrepancy between the severity of the wound and the comparatively satisfactory general condition of the patient is at once noted. The pulse is of good quality and normal rhythm, and the blood pressure is good. Because of this the patient may be misjudged and denied the antishock measures which may save his life.

The author believes that this form of shock occurs more often than is generally admitted, since most of the observations come from the divisional hospitals where the wounded are received relatively late after receiving the injury. He stresses the need for the military doctor to pay more attention to this form of manifestation in order that the patient receives the necessary antishock treatment before the irreversible changes occur in the vital centers which will bring on the torpid form of shock manifestation and end in death.

A remarkable instance is cited of a soldier wounded in the abdomen by shell splinters, with prolapse of the intestines through the anterior abdominal wall, who refused the help of the sanitary corps, swam the river separating the two lines of battle, and replacing his water soaked intestines, ran along under cover of the river bank, avoiding everyone he met until he reached, on foot, the divisional headquarters. There he kept righting himself to a sitting posture on the lit-

ter on which he was placed, and with glittering eyes, pale face, and dry tongue kept close watch on the doctors, refusing operation until suddenly he sank back half unconscious with cold sweat, cyanosis of the visible mucosa and falling blood pressure and rising pulse. Blood transfusion, intravenous fluids, morphine, camphor, and caffeine improved his condition, and immediate midline laparotomy under local anesthesia, with removal of huge quantities of bloody fluids, metallic splinters with parts of bullet casings, and some entire percussion caps (the shell splinter had struck the patient's bullet pouch), with suture of the numerous holes in the small intestinal loops and in the sigmoid colon, was carried out. Before the abdomen was closed streptocidal albumin powder was applied and 750 c.c. of conserved blood was given by transfusion. Following the operation the patient slept for 10 hours.

The postoperative ileus was combated by gastric lavage, syphonclysma, glucose infusions, and calcium, sodium chloride, and urotropin. During the 10 day period of recovery more than 40 liters of normal saline solution and 0.8 per cent streptocidal solution were given. After 17 days at the field hospital the patient was evacuated to the rear in good condition and 2 months later he was reported as completely healed and in good health.

JOHN W. BRENNAN, M.D.

Heusser, H.: The Operation as Trauma. Reflections Concerning the So-Called Postoperative Illness (Die Operation als trauma. Untersuchungen ueber das Wesen der sog. Postoperativen Krankheit). *Helvet. chir. acta.*, 1946, 13: 167.

The author reviews the so-called postoperative illness which was first described as an entity by Leriche in 1933. He reviews all of the effects of an operative intervention on the various systems of the body economy, the symptoms of these effects, and the cause as well as the possible correction of these effects. In considering these he calls attention to the various effects the operation may have upon preexisting diseases of these organs, as, for example, the effect of operations upon patients who have coronary heart disease, absolute or relative. On the other hand, he also calls attention to the effects of the operative procedure upon the normal system.

The effects are mediated both through the vegetative nervous system and through changes in the metabolic and chemical processes caused by the operative intervention and anesthetic. Both psychic and physical trauma are active in the usual operative procedure, so that all of the factors active in a traumatic experience are also existent in a planned surgical procedure. The author calls attention to the fact that the shock state which follows trauma is identical with that following a planned operative intervention. The difference lies in the fact that, in the latter case, the surgeon has the opportunity of studying all of the factors productive of traumatic shock and thus may be able to either obviate or, at least, to minimize them.

The complete study of the patient and the planning of the operative procedure, not alone as an attack upon an organ, but as an approach to a generalized disturbed physiology should obviate the so-called postoperative illness. The evaluation of all of the patient's reactions, the status of the function of the various bodily systems, and the carefully planned anesthetic sequence are prerequisites for this. A thorough study of the status of all of the body's chemical balance and a knowledge of the effects of the surgical operation should almost completely outline the care which will be needed. Thus a study of the body fluids, electrolytes, and proteins, as well as of the red blood cells is important and measures for their replacement should be at hand in any well planned intervention. The evaluation of the cardiac status, the renal status, and the supply of adequate amounts of oxygen is recommended by the author.

WILLIAM C. BECK, M.D.

Hamilton, T. R., and Angevine, D. M.: Fatal Pulmonary Embolism in 100 Battle Casualties. *Mil. Surgeon*, 1946, 99: 450.

A survey was made of 1,065 autopsies on cases in which battle wounds had recently been sustained. It was found that in 66, or 6.19 per cent of these, death was due to pulmonary embolism.

A possible value of an analysis of battle casualties is the absence of such usually plaguing variables as age and previous or intercurrent disease since all of the patients have presumably been physically fit soldiers.

When an individual is lying on his back the increased compression of the left iliac vein by the arterial trunk (right iliac, middle sacral, and left hypogastric arteries) has a direct influence in slowing up the blood stream, and explains the well known frequency of thrombosis in the left lower limb.

One hundred cases of fatal pulmonary embolism in battle casualties are reported.

Venous stasis, caused most frequently by immobilization, appears to be the most important factor in the production of phlebothrombosis.

Pulmonary infarcts were located predominantly on the right side and in the lower lobes.

The prevalence of venous thrombosis on the left side of the body did not have a direct relationship to trauma, which occurred more frequently on the right side.

JOSEPH GASTER, M.D.

Heston, W. E.: Path of Gene Action in Mammary Tumor Development in Mice. *J. Nat. Cancer Inst.*, 1946, 7: 79.

Gene, i.e., chromosomal, control of mammary cancer in mice is considered as it operates along the following three "action paths": (1) influence over the nonchromosomal milk agent; (2) influence over the extra-chromosomal hormonal action; and (3) the control of mammary tissue susceptibility.

Though the milk factor is known to exist by reason of its influence, it has not been isolated and its nature is totally unknown.

Likewise, estrogen production assay techniques permitting the required measurements for this influence are nonexistent.

There are differences in the response of different strains of mice—in their susceptibility to mammary tumors, in their response to the milk factor, and in their response to hormonal stimulation.

Alteration of genetic constitution will apparently eliminate the milk factor influence producing mammary tumor, alter the mammary tumor incidence manifested through hormonal stimulation, and result in differences in susceptibility of mammary tissue to tumor formation.

Statistical evidence suggesting genic control of these influences is presented.

Since (1) there is no direct yardstick against which each influence can be measured independently of others, and (2) individual gene pattern alterations associated with changes of the influences are not mapped, direct proof of gene control over these action paths is not now possible. FRANK B. QUEEN, M.D.

Shimkin, M. B., Wyman, R. S., and Andervont, B.: Mammary Tumors in Mice following Transplantation of Mammary Tissue. *J. Nat. Cancer Inst.*, 1946, 7: 77.

Young male C_3H strain mice freed of the milk agent were transplanted with mammary tissue from C_3H virgin females not freed of the milk agent, and a cholesterol pellet containing 0.4 mgm. (20%) of diethylstilbestrol subcutaneously implanted to furnish adequate estrogenic stimulation for mammary tissue development.

In 19.4 per cent of the 67 mice surviving 8 months or longer, mammary tumors developed. Only one of these arose at the site of the mammary transplant.

Thus an attempt to develop tumors in transplanted mammary tissue in mice failed, but a number of interesting implications were elicited.

It is postulated that sufficient milk factor was carried over in the transplant to cause the incidence of tumors to increase from the theoretically calculated expected normal of 3.5 per cent to 20 per cent incidence; C_3H male mice not lacking the milk factor under the conditions of the experiments would be expected to develop 75 per cent tumor incidence.

There is no explanation for the failure of development of carcinoma in the transplanted mammary tissues (which in all cases survived).

FRANK B. QUEEN, M.D.

Shimkin, M. B., and Wyman, R. S.: Mammary Tumors in Male Mice Implanted with Estrogen-Cholesterol Pellets. *J. Nat. Cancer Inst.*, 1946, 7: 71.

The relationship between the dose of three estrogens, diethylstilbestrol, estradiol, and triphenylethylene, under conditions of continuous absorption and mammary tumor response in male mice of C_3H strain is reported.

Cholesterol pellets containing a concentration of 0.5 to 30 per cent of diethylstilbestrol, 1 to 20 per cent estradiol, and 10 to 50 per cent of triphenylethylene were subcutaneously implanted into one month old mice. Approximately 30 to 40 mice were used for each series (total, 461). The mice were observed usually until tumors developed, or until natural death. No tumors developed in mice receiving triphenylethylene.

From 2.5 to 86.6 per cent of mice subjected to the continuous influence of diethylstilbestrol developed tumors in from 16.8 months' average time with the lower dose, to 6.9 months with the highest dose. With estradiol, from 5 to 77.3 per cent developed tumors, the time range varying from 9.2 months with the smaller doses to 5.9 months with higher doses. Thus there is a correlation between the concentrations of both diethylstilbestrol and estradiol and the incidence of mammary tumors, as well as with the time required for their appearance. Estradiol appears to be the more potent of the two.

The recovered pellets were weighed and the effective dose of estrogen required for tumor induction calculated. Two micrograms of each sufficed to produce mammary adenocarcinoma in 5 per cent of the mice. The absorption necessary to produce tumors in 50 per cent of mice (TD_{50}) is computed at 4 to 10 micrograms for estradiol, and between 20 to 40 micrograms for diethylstilbestrol.

There is no predilection for the occurrence of the tumor near the site of estrogen implantation. There appears to be a correlation between the appearance of multiple mammary adenocarcinoma with the larger doses of estrogen.

The urinary excretion of extrogens in female mice is 0.05 to 0.1 micrograms per day. Thus, the TD_{50} dose of estradiol and diethylstilbestrol for male mice is roughly equivalent to the normal urinary excretion in female mice during 100 to 300 days, respectively, i.e., the carcinogenic dose for male mice is well within the range of concentrations physiologically elaborated by normal females of the species.

The absence of hepatomas in the estradiol and diethylstilbestrol treated mice up to the age of 19 months is of interest. Normally, male C_3H mice from 11 to 19 months of age show a 25.8 per cent incidence of hepatomas, and female mice of this strain in this age group show an incidence of 5.7 per cent. After 19 months some hepatomas did appear—an incidence of approximately 11 per cent in the diethylstilbestrol treated mice, of 21 per cent in the estradiol treated mice, and 18 per cent in the triphenylethylene treated mice. It is suggested that "the later appearance and lower incidence of hepatomas in this experiment may be an effect of estrogenation."

FRANK B. QUEEN, M.D.

Shabad, L. M.: Trends in Cancer Research in the USSR. *Am. Rev. Soviet M.*, 1946, 4: 166.

The author reviews, as the title indicates, the important developments in cancer research in the USSR.

He states that in the USSR, extensive surgery is practiced on cancer. Petrov and his associates at the Leningrad Oncologic Institute have done extensive pioneer work on gastric resections, new surgical methods

for cancer of the esophagus, and on electrosurgery of the stomach. X-ray treatment of bronchogenic carcinoma has been improved by the method of Dillon because the therapy is given through numerous skin sectors converging on the cancer, which requires exact topical diagnosis.

Tumor research has followed the same general lines as in the United States of America. The synthesis of various derivatives of 1,2-benzanthracene and their carcinogenic activity have been studied. Amino-azo-compounds have been rather extensively studied and a transplantable hepatoma was developed in mice. Dispersion of chemical carcinogens has been studied by measurements of fluorescence. A colorimetric method for determination of amino-azo-carcinogens has also been developed. This is applicable to tissues and fluids.

One interesting experiment reported, deals with the influence of inflammation on carcinogenesis; 3,4,8,9,-dibenzpyrene painted with turpentine solvent lowered the incidence of carcinoma formation in mice according to the theory of an "antiblastic" function in acute inflammation. Experiments designed to test the relationship of carcinogenic activity to toxicity disclosed no correlation.

Endogenous carcinogens have been studied and, as in this country, substances having carcinogenic activity were extracted from the liver, bile, lungs, and occasionally from the urine of patients dying with malignant neoplasms. The nature of these endogenous carcinogens is unknown but it is concluded that they are not cholic or desoxycholic acid.

A synergistic action between exogenous and endogenous carcinogens is postulated. Actinic carcinogenic factors have been studied without definite conclusions.

Considerable attention has been devoted to virus tumors. The author considers that the agent of "virus" growth may be an endogenous chemical substance of cellular origin. Experiments cited permit no conclusion either way.

A complement fixation test aiding in the recognition of the milk factor in spontaneous mammary carcinoma of mice (strain A), and in an innoculated growth (strain MAP) is also reported. The author questions whether the milk factor is a virus or an endogenous chemical produced by the epithelial cells of the mammary gland.

The role of heredity has been studied in some detail in 126 pairs of human twins, at least one of whom developed cancer. Of 31 pairs of monozygotic twins, 27 presented only one of the pair with cancer, while both twins in 4 pairs suffered from cancer (12.9% similarity). In 95 pairs of dizygotic twins, both members were affected in 13 pairs (13.7%), an incidence close to that of monozygotic twins. This leaves no foundation for assuming a general hereditary susceptibility to neoplasia in man. However, the neoplasm is similarly located much more frequently in monozygotic twins than in dizygotic twins. Thus, the reactivity of tissues to the carcinogenic agent may depend directly upon genetic factors.

The studies in carcinogenesis have shown that some polymorphocellular sarcomas are of myogenic origin, and that these malignancies tend to slow down growth and revert to the primary normal tissue. Nuclear studies show a typical mosaic consisting of translocations of various chromosomes in malignant cell nuclei.

The antireticular cytotoxic serum of Bogomolets was tested for the control of metastases and relapses after surgical excision of cancer. Results are not mentioned although it is stated that the use of this serum in animals (mice) reduced the development and incidence of methylcholanthrene tumors.

The section of "certain nerves" is said to modify the growth of experimental tumors and the localization of metastases.

The anticancer properties of blood and spleen (antiblastic properties) studied in mice with early carcinoma were found to be absent in the serum of cancer patients, but they were present in that of healthy men.

The mitogenetic property of blood and tissues was studied from a diagnostic viewpoint. This mitogenetic radiation of the blood was lost in cancer cases because of a special substance called "extinguisher." "Extinguisher" also appears in the blood of mice following the subcutaneous implantation of carcinogens.

FRANK B. QUEEN, M.D.

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Curley, F. J., and Aycock, W. L.: The Effect of Stilbestrol on Resistance to Experimental Poliomyelitis. *Endocrinology*, 1946, 39: 414.

In previous experiments it had been shown that the resistance of castrated monkeys to intranasal instillation of the virus of poliomyelitis was enhanced by the intramuscular injection of estrogenic hormone. The present experiments were performed to determine the conditions under which this enhancement occurred. They did not in themselves afford any indication as to whether the mechanism of resistance set up by the administration of estrogen lay in a physiological blockade of the nasal mucosa (in the fashion of a chemical blockade preduced by local application), or in some more deep-seated structure, as, for example, the central nervous system itself.

In the first group of experiments, normal immature monkeys were treated with stilbestrol, testosterone propionate, or both, and were then subjected to intranasal instillations of monkey poliomyelitis spinal cord emulsion. In the second group, the experiments were repeated, but in these animals castration had been performed 2 weeks before the beginning of hormone injections. The stilbestrol-treated animals which failed to succumb were later inoculated intracerebrally along with normal monkeys as controls. In the third group, castrated female monkeys were treated with reduced amounts of stilbestrol and then inoculated intranasally along with the controls. The monkeys which survived were inoculated intracerebrally.

The treatment of normal monkeys with stilbestrol or testosterone produced no increase in resistance, while stilbestrol treated castrates showed a marked

increase in resistance to intranasal instillations of the virus. Testosterone alone had no protective effect. Stilbestrol treated animals which had resisted repeated intranasal instillations of virus, although kept on stilbestrol, showed no increased resistance to subsequent intracerebral inoculation.

That repeated intranasal instillations of virus under the protection of stilbestrol did not serve to immunize is indicated by the fact that subsequent intracerebral inoculation resulted in experimental poliomyelitis in all animals so treated. That the intracerebral inoculations were not too severe a challenge as a test for immunity is suggested by previous studies demonstrating the resistance of intracutaneously immunized monkeys to similar intracerebral inoculations.

DAVID H. LYNN, M.D.

Cherkasov, A. V.: Peculiarities of the Disease Course in Recurrent Typhus in Children. *Pediatria, Akysherstvo i Ginekologiya*, 1946, No. 2, p. 8.

Cherkasov noted numerous cases (26 per cent) in which there were more than 3 recrudescences and remissions in the course of the illness. Four and one-half per cent of the patients had recurrence of fever following apyretic periods. Not infrequently there were disturbances in the usual course of the disease; in 11 per cent the second attack was longer than the first; in 7 per cent the third attack was longer than the second; in 6 per cent the second period of apyrexia was of shorter duration than the first; and in 4 per cent the two periods of apyrexia were of equal duration. Frequently the recurrence took place after as long a period of apyrexia as 15 days. In general, the course of the disease was favorable, that is, there were no deaths in uncomplicated cases. A 3 dose course of mapharsen increased the number of patients who suffered a single relapse of typhus. As a rule, penicillin produced a fall in temperature in the course of the first 24 hours; however, a 4 day course of this drug did not prevent recurrence. Nevertheless the recurrent attack occurred later (after 14 or 15 days), as a rule, and exhibited a milder course (1 or 2 days). The antireticular cytotoxic serum of Bogomiltz did not produce remission of the attack when given alone, and, in the author's opinion, did not modify the duration of the individual attack nor prevent recurrence.

JOHN W. BRENNAN, M.D.

Tziba, M. D., and Trushinskaya, M. M.: Peculiarities of the Disease Course in Abdominal Typhus in Children at Kiev from 1944 to 1945. *Pediatria, Akysherstvo i Ginekologiya*, 1946, No. 2, p. 12.

Tziba and Trushinskaya note that in the material of the Oxmatdeta Institute for Infectious Diseases for the years 1944 and 1945 the cases of abdominal typhus in children ran a rather severe course in the majority of instances; in 74.6 per cent of the patients the course of the disease was severe or moderately severe. Especial attention is directed to the long period of complete morbidity and to the relapses and manifestations of the cardiovascular system. In the neuropsychiatric sphere also there were pronounced manifestations. In many instances the early exhaustion of the nervous system was notable and there were pronounced manifestations of asthenia and psychic disturbances in the sense of a negativism. Encephalitic manifestations were both frequent and early.

The Widal reaction was positive in 54 per cent of the children with an outspoken clinical picture of typhus abdominalis, appearing, however, more frequently in the later course of the condition, or even during convalescence. In two or three periods during the height of the clinical picture of typhus abdominalis, the characteristic macroscopic changes in the small intestines were found. However, in the great majority of children, microscopic examination failed to uncover the characteristic local hyperplasia of the reticular cells of the lymphoid tissues in Peyer's patches and in the regional lymph glands. Every picture of the changes in the lymphatic tissues in these young patients was characterized by the complete absence of germinal centers in the follicles of the lymph glands and by the poorly developed hyperplasia of the reticular stroma. In the authors' opinion this indicates a lowering of the reactive power of the organism of the child.

JOHN W. BRENNAN, M.D.

DUCTLESS GLANDS

Dougherty, T. F., and White, A.: Pituitary-Adrenal Cortical Control of Lymphocyte Structure and Function as Revealed by Experimental X-Radiation. *Endocrinology*, 1946, 39: 370.

A single injection of either pituitary adrenotropic hormone or adrenal cortical preparations have produced changes in lymphoid tissue similar to those seen following roentgen radiation. This suggested to the authors that pituitary-adrenal cortical secretion might be a normal physiological mechanism concerned with certain of the physiological actions of x-rays. Recent studies, however, have demonstrated that whereas small doses of x-rays produced unmistakable alterations in lymphoid tissue structure and function of normal mice, large degrees of radiation would produce similar effects even in the absence of the animal's adrenals. These observations suggested further study with radiation.

Mice of both sexes, some of which were adrenalectomized, and male rats, some of which were either hypophysectomized or adrenalectomized, were used. Radiation was generalized over the entire body. Determinations were then made of the total white count, differential count, whole blood specific gravity, total serum protein, and their components as separated by electrophoresis and the anamnestic response to x-rays of those animals immunized to sheep erythrocytes. A careful histological examination was also performed at autopsy, particularly on all lymphoid structures.

X-irradiation of normal animals produces an increased secretion of pituitary adrenotropic hormone

as evidenced by a depletion of sudanophilic material of the adrenal cortex and a marked decrease in the total cholesterol content of the adrenals.

Irradiation of normal mice with 10 or 200 roentgens, and normal rats with 200 roentgens, produces a decrease in the absolute number of circulating lymphocytes. On the other hand, the adrenalectomized mice, given 10 roentgens, do not show a significant lymphopenia. Two hundred roentgens produce a profound leucocytosis with absolute lymphopenia in adrenalectomized mice or rats and in hypophysectomized rats. This effect could not be ascribed to hemodilution since the specific gravity of the blood was increased slightly. Handling of the mice prior to irradiation was found not to lower the lymphocyte count, as had been suggested by certain other investigators.

Irradiation of normal mice with 10 or 200 roentgens, or adrenalectomized mice with 200 roentgens revealed histologically a degeneration of lymphocytes with an initial development of macrophages, edema of the lymph nodes, and swelling of the reticuloendothelial cells. The disappearance of the lymphocytes resulted in a decreased size of these organs. These changes were similar to those observed in a previous study following the injection of adrenotrophic or adrenal cortical hormones. Adrenalectomized mice exposed to 10 roentgens showed only very slight changes in lymphocyte structure and a shorter period of time for the maximal effect of lymphocyte dissolution. The most significant histological difference between the normal and adrenalectomized mice given 200 roentgens was the extreme rapid reconstitution of lymphoid tissue which occurred in the operated animals.

Irradiation produced in all instances a large increase in gamma globulin and a slight increase in the beta fraction. Alpha globulin of adrenalectomized mice, but not of normal mice, also increased following 200 roentgen exposure. The authors reason that the release of globulin to the circulation results from the normal dissolution of lymphocytes in lymphoid structures and is under pituitary-adrenal control unless large doses of radiation are used.

The anamnestic response was not marked in adrenalectomized mice given 10 roentgens in contrast to the response in the unoperated animals, or to large doses. This suggests that 10 roentgens influenced lymphoid tissue function by augmenting pituitary-adrenal cortical secretion.

Previous investigation has shown that one of the regulators of the rate of delivery of lymphocytes to the circulation is pituitary-adrenal cortical secretion. Lymphopenia following the administration of adrenal cortical steroids is a reflection of lymphocyte dissolution in lymphoid organs. Conversely, the lymphocytosis of adrenalectomized animals is probably due to the absence of the hormonal mechanism normally controlling lymphocyte dissolution.

The authors suggest that x-rays have both a direct and an indirect effect on the lymphocytes, the latter effect being mediated by the increased pituitary-adrenal cortical activity. DAVID H. LYNN, M.D.

Houssay, B. A., Foglia, V. G., and Martínez, C.: The Influence of the Thyroid on Alloxan and Pancreatic Diabetes in the Rat. *Endocrinology*, 1946, 39: 361.

This study concerns itself with the effect of thyroid deficiency and thyroid excess on the diabetes produced in the rat by the administration of alloxan, or by the extirpation of 95 per cent of the pancreas. Hypothyroidism was produced by thyroidectomy or by treatment with thiouracil, whereas hyperthyroidism was obtained by the administration of powdered thyroid. Alloxan was given either intravenously or intraperitoneally.

Thyroidectomized animals showed a greater resistance to the diabetogenic and toxic actions of alloxan than did normal animals. Resistance to alloxan was below normal 20 days after daily thyroid treatment, and above normal 60 days after daily treatment. Thiouracil treatment produced an even greater resistance to alloxan than did thyroidectomy. Thyroidectomy, when performed simultaneously with pancreatectomy, prevented the appearance of diabetes but had no effect on incipient or manifest diabetes. Thiouracil treatment prevented the appearance of diabetes after pancreatectomy in a large percentage of animals. Thyroid treatment in pancreatectomized rats caused an earlier appearance of diabetes during the first 15 days; later, however, this diabetic state gradually disappeared, not to reappear, in spite of continuous treatment. Diabetes appeared in all nontreated rats and persisted. Incipient diabetes in pancreatectomized rats completely disappeared with thyroid treatment.

The authors postulate that thiouracil may increase the resistance to alloxan by virtue of the presence of sulfur or the sulfydryl group (–SH–) in the thiouracil molecule. These experiments indicate that hypothyroidism exerts a certain degree of protection on the B cells, which the authors suggest may be the result of (1) a relative functional rest of the islets since the lowered metabolism and rate of growth requires less insulin; (2) a modification of the anatomical or chemical constituents of the islets, making them more resistant to diabetogenic factors; and (3) increase in the production of insulin brought about by hypothyroidism.

Histological study seems to indicate that thyroid administration in rats, in continuous form, would lead to an improvement or to the disappearance of diabetes due to a new formation of islets or to the enlargement of the existing ones in the portion of the pancreas which remains after operation. This is in contrast to the results obtained in the dog.

DAVID H. LYNN, M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

Bing, J., Naeser, J., Rasch, G., and Røjel, K.: Serum Proteins in Normal People. *Acta med. scand.*, 1946, 126: 351.

Although numerous investigations have been made concerning serum proteins and their fractional values

in disease states, the authors observed that there was a paucity of material regarding the protein content of normal serum. In reviewing the literature they noted a constant difference according to the method of protein analysis used. Of the two chief determinations, that of Henriques and Klausen is considered more exact when compared to the test of Howe.

The total serum protein, albumin, and globulin were measured in 87 clinically normal people (38 males and 49 females) by the method of Henriques and Klausen. A careful statistical analysis of the results was made with attention to the variation according to sex and age. Although small differences were found for these factors, they were so small that for practical purposes they can be ignored. The following values were obtained:

Total protein:	5.6–8.2
Albumin:	3.5–5.5
Globulin:	1.6–3.2

C. Frederick Kittle, M.D.

EXPERIMENTAL SURGERY

Blaine, G.: Experimental Observations on Absorbable Alginate Products in Surgery. *Ann. Surg.*, 1947, 125: 102.

The author briefly describes important advances made in the prevention of adhesion formation in the course of tissue repair, the arrest of capillary hemorrhage, and the closed treatment of burns through the development of new materials. He states that there are disadvantages to some of the materials previously used. He also states the qualifications of any new material to be used—absorbability at a readily controlled rate; the tissue reaction must compare favorably with that of protein fibers and oxycellulose; the material must be easier and cheaper to produce; it must be compatible with penicillin and other antibacterial substances; it must allow sterilization by routine methods; its physical properties must allow modification of plasticity; and it should be able to "carry" substances and ensure their controlled, delayed absorption in the organism. Such a material, he believes, is found in the extract of brown seaweeds —alginic acid—the formula of which resembles that of cellulose. Many salts can be prepared from this acid. The sodium salt—sodium alginate (NaAlg)—undergoes instantaneous coagulation when acted upon by calcium. This reaction is the basis of preparing clot, film, filament (from which gauze can be woven), or foam. A certain limited range of "rigid" plastic objects can also be prepared.

The author describes the physical properties of the most useful salt—calcium alginate (alginate gel, film, gauze, and foam)—its ready sterilization, its biochemical properties, and its physiological properties in animal tissues.

From the experiments on alginate products he concludes that this substance, used as clot, film, or gauze, is absorbed in animal tissues. Tissue reaction is minimal and the rate of absorption can be varied by the use of various strengths of sodium alginate or calcium chloride. The absorption rate varies with the physical form and bulk of the product—alginate cloth or gauze is slowest, the alginate film is quickest. Alginate products are readily autoclaved and have no inhibitory effect on penicillin. In view of these findings, the author believes that alginate products possess properties making them attractive for surgical use.

G. Albin Liva, M.D.